

Chapter 1: Introduction

Many societies are endeavouring to reduce the environmental impacts of human activity through increasing legislation, media campaigns, fiscal, monetary and other policies. However, many also consider that education of young people in schools should play a primary role in a cultural shift towards sustainability. If school education is to contribute to the sustainability of Earth's biophysical systems, then how can that education be advanced?

It is widely claimed that provision of knowledge of environmental problems is of itself inadequate as a means of encouraging people to protect the environment (Kollmuss & Agyeman, 2002). It is argued below that much more is required and that through education people should come to understand the interrelatedness of natural, social, economic and political systems; care about the environment; develop the capacity to think critically about our contemporary values and practices; and work collaboratively in a way that conserves and improves environmental well being (Australian Department of Environment and Heritage (ADEH), 2005). Implementing education of this kind demands a high level of skill on behalf of teachers.

1.1 Context

Whilst contemporary unsustainable practices and the role of education in generating a culture of sustainability is an international concern, this research began in New South Wales (NSW), Australia in a provincial university. At this particular university, aspects of Education for Sustainability (EfS) had been taught for many years to undergraduate primary teachers through the science team of teacher educators. In 2007, this teaching was altered to more closely accommodate the shifts that had occurred at an international level in the emerging field of EfS. Following the initial stages, the research was then conducted with graduates from the university who were teaching in a number of public primary schools.

My interest in this topic arose from my care for the environment alongside my consternation regarding unsustainable practices and excessive exploitation. After over a decade of working with school students and teachers in Environmental Education Centres and later with pre-service teachers I realised that there were many others who shared my interests. There were teachers and pre-service teachers who appeared keen to pursue environmental work in their teaching, but were unsure of how this could be achieved. Thus from my recognition of the enthusiasm of various people, and of obvious gaps in the published literature, my investigation began into the issues of teaching and EfS.

1.2 Rationale

Teacher education has been recognised internationally as a key to improved environmental education in schools since the Tbilisi Declaration in 1977. In 1990, UNESCO-UNEP identified teacher education as the ‘priority of priorities’ to improve the effectiveness of environmental education (Tilbury, Coleman & Garlick, 2005:49). The underlying assumption was as follows:

Arguably the most rapid educational transformation to more sustainable lifestyles will occur if the pre-service and in-service teaching programmes used to educate the world’s 60 million teachers (including the higher education academics who teach teachers ...) are reoriented towards sustainability (Shallcross, 2008:138).

Whilst international and many national policies endorse and promote education to protect the environment, it appears that the uptake of education of some kind surrounding issues of sustainability at school and tertiary levels in Australia (Tilbury, Coleman & Garlick, 2005), and elsewhere (see for example Chatzifotiou, 2006; Beckford, 2008), has been inconsistent. Furthermore, research by Miles, Harrison and Cutter-Mackenzie (2006) with pre-service primary teachers in Australia indicated that, although these people were generally keen to draw on environmental teaching in their future careers, many felt their levels of preparedness and confidence were low and their knowledge inadequate.

Given the apparent reluctance of schools and universities to embrace the pedagogies of EfS, and the identified need for teacher education, this research seeks improved

means of facilitating EfS in pre-service teacher education. The intention is that the adoption of EfS in teacher education and ultimately in schools is facilitated and encouraged.

1.3 Research questions

To this end, the broad question that informs this research is:

How can pre-service teacher education better prepare beginning teachers in Education for Sustainability?

This question will be interpreted in relation to the specific context of a pre-service teacher education unit of study and gives rise to two specific sub-questions:

1. *How does a teaching unit in EfS impact on pre-service teachers?*
2. *In what ways do beginning teachers engage with EfS and why?*

To 'engage' here refers to the manner in which participating individuals include EfS in their work.

1.4 Significance of the research

This research promotes the broad goal of sustainability through investigating ways teachers learn about the notion of sustainability and what is deemed effective in EfS, and then how they apply these understandings as beginning teachers. Currently there is insufficient knowledge about the ways in which people come to understand the notion of environmental, social and economic sustainability and the ways in which such understandings can best become a part of everyday learning in schools. Therefore research in this field is critical to a cultural shift towards sustainability. In particular the present research is significant because:

- Education for Sustainability has only partial representation in schools in Australia (Tilbury, Coleman & Garlick, 2005) and elsewhere (Chatzifotiou, 2006; Beckford, 2008; Eames, Cowie & Bolstad, 2008) and this work with pre-service teachers aims to improve that representation;
- Whilst some excellent programs of EfS in teacher education have been implemented (see examples in Ferreira, Ryan & Tilbury, 2007b), it has been reported that only some teacher education institutions substantially address EfS in Australia (Tilbury, Coleman & Garlick, 2005) and elsewhere (Powers, 2004; Firth & Winter, 2007; Beckford, 2008; Lindemann-Matthies et al.,

2009; Yavetz, Goldman & Pe'er, 2009). This research will add to a growing body of literature about the nature of EfS in teacher education;

- The nature, intention, duration and outcomes of reported efforts at teacher education in EfS are extremely diverse. Whilst the teaching unit reported later in this study is yet another approach, it has been constructed and described within a local policy framework as recommended (UNESCO, 2005). It therefore should be particularly significant to Australian teachers, schools and policy makers and beyond that of interest to others in the field;
- In a search for commentary on the nature of pre-service teacher preparation in EfS, no study has been identified that reports on links between pre-service teacher education and the initial teaching years. This research, with its focus on early career teachers, begins to address a major gap in the field;
- Whilst there are many policies in EfS, it has been recognised that there is a gap between policy and practice (Robertson & Krugly-Smolkska, 1997). Some suggest that there needs to be less reliance on policies and more work with teachers to identify a way forward (Stevenson, 2007). The present research will draw attention to the context of schools within which early career teachers work. This will allow the views of teachers to be reported, and will open up a discussion about the congruence of policies of EfS with other priorities of schooling;
- It is a recommendation of the *National Review of Environmental Education and its Contribution to Sustainability in Australia* (Tilbury, Coleman & Garlick, 2005) that teacher education courses aligned with the *National Environmental Education Statement for Australian Schools* (ADEH, 2005) should be developed. The latter document was influential on work reported here and so it responds to a national imperative. Findings from this research will inform national programs in teacher education in EfS; and
- A major strategy of the Australian Government's *National Action Plan for Education for Sustainability* (AGDEWHA, 2009) is to promote integration of sustainability into university degree accreditation, and to prioritise research in teaching as one of the professions that will have the greatest impact on sustainability outcomes.

1.5 Assumptions

The following assumptions are central to this study:

- EfS will encourage and enable people to pursue better outcomes for sustainability of Earth's biophysical systems into the future;
- whilst education has a fundamental role to play in shaping the future, a mutual effort needs to be made across society if more sustainable ways of living are to eventuate;
- improved ways need to be found to achieve EfS within the existing school framework;
- an EfS focus in teacher preparation will lead to more efficacious and prevalent school EfS;
- novice teachers who do not experience EfS in pre-service education lack skills to do so and the chances are they will ignore it and prioritise something else; and
- study of a small number of individual early career teachers in schools can provide useful insight into ways of improving pre-service work in EfS.

1.6 Delimitations

This research is:

- focused on one cohort of pre-service teachers from one module of study at one university; and
- being undertaken by one individual who also had considerable responsibility for the tertiary teaching unit that is central to the study.

1.7 Definition of terms

It is important to define certain concepts that will be used frequently throughout this study.

Education for Sustainability: is about a shift towards a more sustainable society through building student capacity to care and to enact change. The following

definition from Tilbury (1995) will be used. This definition will be discussed in Chapter 2. EfS:

- has relevance in that it deals with contemporary issues of concern to learners;
- is holistic in identifying, through the curriculum, the whole picture surrounding an issue;
- not only teaches about values but also teaches values, in this case ‘an environmental ethic’ (Tilbury, 1995:201);
- is issues-based wherein students are required to consider factual and affective aspects;
- is action-oriented; and
- involves critical education.

Environmental education is used in a general way to refer to the overall field of education that fosters understanding of the environment as an integrated system. This is distinct from Environmental Education (EE) which is defined in Chapter 2.

Pedagogical content knowledge refers to knowledge and beliefs about the purposes of teaching a subject at different grade levels; knowledge of students’ conceptions and misconceptions of particular topics; knowledge of curriculum resources available for teaching particular topics; and knowledge of instructional strategies and representations for teaching particular topics (Grossman, 1990).

Socially critical pedagogy underpins Education for Sustainability and Education for Sustainable Development. It explores real environmental issues using an investigative approach, and seeks amelioration of problems in a democratic, participatory and collaborative manner. It engages people in thinking critically about the relationships between society, politics, economy and environment and is in contrast to an approach that imposes previously constructed actions (adapted from Robottom and Hart 1993).

1.8 Organisation of this dissertation

This dissertation is organised into twelve chapters. Chapter 2 provides a clarification of terminology and an overview of some of the major debates and research relevant to

the present study. The context of this study, meaning the Australian policy, school and teacher education environment relevant to EfS and its implementation is discussed here. The methodology, research design, methods and analysis procedures are discussed in Chapter 3.

Chapter 4 outlines the rationale behind the development of the pre-service teaching unit in EfS that is central to the study, and outlines some of the conceptual content and pedagogy involved. Chapter 5 begins to answer the first sub-question of the study through analysis of data derived during the teaching of the unit. Chapters 6, 7, 8, 9 and 10, in response to the second sub-question, report on case studies of five early career teachers as they began work in the teaching profession. In Chapter 11 there is a discussion based on a multi-case analysis with reference to literature in the field. Finally Chapter 12 draws on the preceding chapters to present a series of conclusions, implications and recommendations relating to the teaching of EfS in universities and schools.

Chapter 2: Education for Sustainability and Pre-service Teacher Education

2.1 Introduction

Teacher education has been on the agenda of the literature surrounding sustainability for some decades but little appears to be published about what occurs, and very little indeed reports on how existing teacher education and pre-service teacher education corresponds with the context of schools, the needs of teachers or indeed the aspirations of the field. The complexity of the situation is compounded by lack of agreement over what those aspirations are and by confusion over terminology. Description of the complexity and unravelling of the confusion is a first step because foundational to this project is the implementation of EfS within a pre-service teacher education award.

Education for Sustainability (EfS) is the term that will be used for this project (as justified below). A comprehensive reading of the literature must include Environmental Education (EE), and Education for Sustainable Development (ESD) as well as EfS. This is because there are commonalities in the work using these three terms, and therefore all will be drawn upon to inform this study.

In this chapter, following an initial discussion of terminology and the conceptualisation it represents, various criticisms relevant to EfS will be introduced, along with an account of a number of responses to issues that have been raised. Attention will then turn to the context of schools, what is expected of them and what is known to occur in NSW in particular. The concluding sections of this chapter examine the literature on teacher education relevant to EfS as well as the experiences of beginning teachers. This is so that the particular circumstances which they are likely to countenance can be better understood.

2.2 Terminology

Terminology in this field has been a vexed issue with many differing views and opinions over three dominant terms namely: EE, ESD and EfS. The multiple terminologies in this field can be both confusing and discouraging. It has been claimed that there is confusion amongst practitioners about what EfS or ESD actually mean (see for example Taylor, Nathan & Coll, 2003; Zachariou & Kadji-Beltran, 2009) and that this is one of the barriers to implementation (Cross, 1998; Meyers, 2006; Chapman, 2007; Robottom, 2007). The international debate about what the terms EE, ESD and EfS should mean, and what might distinguish each, is well documented (see for example *Special Issue of Environmental Education Research* Volume 8, Number 1, 2002; McKeown & Hopkins, 2003; Gough, 2006; Chapman, 2007; Robottom, 2007; Stevenson, 2007). The section that follows will provide an historical perspective of how terms in this field have changed since the 1960s and 1970s and how the use of these terms continues to change today. The extent to which there has been a concomitant change in the thinking about content and pedagogy remains contested (Robottom, 2007).

Environmental Education, Education for Sustainable Development and Education for Sustainability

Environmental Education, here designated as 'EE', gained significant international status during the Tbilisi Intergovernmental Conference on Environmental Education in 1977, where the goals of EE were established (UNESCO, 1978; Gough, 2006; Chapman, 2007). These goals included:

- the fostering of awareness and concern about economic, social, political and ecological interdependence;
- provision of opportunities for people to acquire the knowledge, values, attitudes, commitment and skills to protect and improve the environment; and
- creation of new patterns of behaviour in individuals and groups towards the environment (Gough, 2006).

The documented goals of EE recognised the importance of cooperative action *for* the environment with an emphasis on the resolution of environmental problems, *and* balancing of social, economic and environmental goals. McKeown and Hopkins

(2003) claim that the key word in the definition of EE from the Tbilisi Declaration, as well as from the earlier Belgrade Charter (1975), was *environment*, as threats to the natural environment were of uppermost concern at that time. Lucas (1979) characterised EE as *about, in* and *for* the environment and this conceptualisation was widely adopted (see for example NSW Department of Education, 1989). However there are claims that the *interpretation* of EE was more *about* and *in* the environment, commonly associated with science and development of awareness of environmental problems (see for example McKeown & Hopkins, 2003; Eames, Cowie & Bolstad, 2008).

In the present, EE refers to the field of endeavour, most often described in the USA, in which the goal is to promote active care for the environment. The contemporary research aim of this ‘traditional EE’, described in a later section, is to find those factors in education most likely to contribute to the goal of strategic environmental behaviour (Chawla & Cushing, 2007).

In the 1980s ESD became the term commonly associated with contemporary operations of UNESCO and maintains popularity in literature from, for example, Europe including the UK (Posch, 1999; Scott, 2007; Breiting & Wickenberg, 2010). ESD is also a term associated with the Brundtland Report (WCED, 1987; Chapman, 2007) and later with *Agenda 21* which arose from the Earth Summit at Rio de Janeiro in 1992 (McKeown & Hopkins, 2003).

‘Sustainable development’ is about economic growth, addressing ‘socio-economic issues of poverty and underdevelopment’ (UNESCO, 2004), with ‘concern for the environment and the stewardship of natural resources’ (UNESCO, 2004). Central to ESD is the notion of equitable sharing of resources amongst current and future generations (Lenzen & Murray, 2001; Robottom, 2007) and realisation that improvement of health and welfare of people into the future could only occur with conservation of natural resources. ESD is different from EE as defined above. In ESD ‘the goal shifted [from EE] to find a realistic and balanced approach to environmental protection while alleviating human suffering and the ravages that accompany poverty’ (McKeown & Hopkins, 2003:120). They claim *Agenda 21* ‘presents a more balanced

blend between sustainable human development and environmental protection' (McKeown & Hopkins, 2003:120). The primary focus of ESD is not the environment *per se* but human development that considers the environment. McKeown and Hopkins (2003) maintain that although EE and ESD are related, they are two separate fields of endeavour.

Education for Sustainability is commonly interpreted as being about *sustainability* of the *biophysical* world and of *social and economic systems*. Whilst an understanding of economic, social and ecological interdependence has always been a component of EE, EfS represents another a shift in emphasis (Gough, 2006; Chapman, 2007). In EfS, greater prominence is given to the notion that the future brings change and that education should equip people individually and collectively to shape a future that is more sustainable. The key word here is no longer environment but *sustainability*.

Education for Sustainability shares with ESD a common heritage in the UN Decade of Education for Sustainable Development (DESD), and a common conceptualisation in the emphasis on capacity building for change. This notion is expressed in the following conceptualisation of ESD from Tilbury (2004:103):

It is now understood that sustainability is a process of adaptive management and systems thinking ... Through team work and working across disciplines, social groups learn from each other as they consider options and consequences of these options for the future. Critical to ESD is learning how to motivate and manage change towards sustainability within organisations or institutions ... It differs from the commonly practised environmental education approaches in that it goes beyond addressing values and attitudes of the individual to build their capacity for instigating and managing change.

ESD is not the term chosen for this dissertation. Economic development for primarily social purposes is an important goal of UNESCO wherein the term ESD holds sway. Issues of economic and social sustainability are clearly a part of EfS. However, the prominence given to 'development' in ESD, places ESD as somewhat separate from EfS. In the present work, the *primary* focus is on environmental issues within a global and local context of social and economic sustainability, rather than the goal of equitable social development with consideration for environmental sustainability. This

is not to imply that issues of global inequality are not on the agenda of schooling in Australia. They most necessarily are. The point being made is one of emphasis.

The term EE has not been chosen for use in this dissertation either. EE, as used in the past, no longer reflects contemporary notions about the analysis of social and political values influencing environmental decision making, and the importance of action in the social and political spheres. The term EE, as it is used in mainly the United States in the present (Scott & Oulton, 1999), for example in the work of authors such as Chawla and Cushing (2007) and Darner (2008), does not necessarily reflect the manner in which schools are being encouraged to approach education regarding environmental issues in Australia and elsewhere (Kyburz-Graber & Robottom, 1999; Scott & Oulton, 1999).

EfS defined

For the present purposes, the term 'EfS' has been chosen. The definition used in this dissertation to anchor the discussion about EfS will be that proposed by Tilbury (1995). EfS:

- has relevance in that it deals with contemporary issues of concern to learners who are encouraged to explore links between their personal lives and wider environmental and social concerns;
- has a holistic curriculum base in addressing environmental issues and in teaching and learning, identifying the whole picture surrounding an issue;
- not only teaches about values but also teaches values, in this case 'an environmental ethic which has sustainable living at its core'; highlighting 'the importance of valuing the interrelatedness of the web of life and promot[ing] the principal value of concern for all life forms' (Tilbury, 1995:201);
- is issues-based wherein students 'consider matters of fact, values and morality', to allow for an 'exploration of moral, social and political values required for the development of an environmental ethic' (Tilbury, 1995:202);
- is action-oriented, both in encouraging learners to personally and collectively take actions towards sustainability, and in promoting the use of active teaching and learning strategies; and

- involves critical education, that is, an education that develops socially critical and political literacy skills, necessary because of the social complexity of environmental issues.

With sustainability at its core, this EfS definition acknowledges the links between social and environmental issues, but retains a focus on the development of an environmental ethic. It also provides some information about how EfS should be accomplished. In particular, the definition states that issues selected should be of *relevance to the learner*; development of an environmental ethic should be *through exploration*; the focus on environmental issues should be *holistic*; fostering of awareness about economic, social, political and ecological interdependence should be done *in a socially critical way*; and change towards more sustainable living should be through *use of active teaching and learning strategies*.

The decision to use the term EfS has been made for a number of reasons. Firstly, EfS best conveys a notion of education that addresses knowledge and skills for a changing future without losing sight of the imperative for understanding and valuing conservation of the biophysical world. Secondly, in the main, the conceptualisation of EfS as defined above is in keeping with the views of the researcher, specifically when EfS is interpreted as education that is critical of current social practices and that advocates a style of education where students are taught the skills of critical social analysis, consensual planning and change for a more sustainable future. Thirdly, EfS as described by Tilbury (1995) involves a process of learning which can be interpreted in a way that is in accordance with broader contemporary educational thinking in NSW. In particular, NSW has adopted the Quality Teaching framework (NSW DET, 2003) with its focus on intellectual engagement and relevance of work (Queensland State Education, 2004) in all areas of teaching, and matters of environment are relevant to both. Finally, 'EfS' is now being used in Australia in the most recent documents and major web-based resources (for example AuSSI and Sustainable Schools) shaping this area of education, and increasingly amongst teachers and teacher educators (see for example Littledyke, Taylor & Eames, 2009).

In addition to the term 'EfS', use will also be made of the term 'environmental education'. The term 'environmental education' will be used in a generic sense to refer to educational activity, common to EE, EfS and ESD, that is, attention to the general field of the environment. This use of the term 'environmental education' follows the lead of many contemporary authors who adopt the practice of using the term 'environmental education' in a generic sense (see for example Robottom, 2007; Eames, Cowie & Bolstad, 2008; Ferreira, 2009). Eames, Cowie and Bolstad (2008) draw attention to the conflation of the terms 'environment' and 'sustainability' in education and the tension that this has caused (see also Gough, 2006; Chapman, 2007; Robottom, 2007). Eames, Cowie and Bolstad (2008:35) recognise that 'sustainability' education signals 'an integration of concerns for social, political and economic development, and addressing education for long-term ecological and social sustainability', but explain that the term 'environmental education' remains in common usage whilst referring to what is essentially education surrounding sustainability. Indeed key Australian documents in the field bear titles that include 'environmental education' and the leading national professional organisation maintains the term in its title (Australian Association for Environmental Education) even though all are concerned with issues of 'sustainability'.

Issues of terminology within NSW and Australia

In NSW, where this study is located, the terminology remains fluid. Early on the term 'environmental education' was common, and remains so (as in the current NSW 2001 *Policy on Environmental Education for Schools*). More recently the term 'EfS' has become increasingly evident and is used concurrently (as in the Sustainable Schools Program (NSW DECC & NSW DET, 2006)) with 'environmental education'. Despite this, the year 2010 has been declared the NSW DET *Year of Learning for Sustainability* (LfS). This name shift likely reflects the fact that those initiating state wide EfS projects in NSW perceive a change in the way that they conceptualise what they do and what they aspire to do.

Whilst EfS is the commonly chosen term in the most recent official documents in Australia (AGDEWHA, 2009; ARIES, 2009), this should not be construed as meaning that the term is in common use in schools and communities. A study

conducted in regional NSW in 2003 found that the term EfS was not in common use at that time (Taylor, Nathan & Coll, 2003). It must be acknowledged however that in Australia there has been increasing use of the term EfS and this may reflect the shift in conceptualisation that use of the term ‘sustainability’ represents (Nolet, 2007). The shift is recognisable in recent official documentation (AGDEWHA, 2009; ARIES, 2009) as well as in the activity of particular educators in the field (see for example the NSW Sustainable Schools project (NSW DECC & NSW DET, 2006)).

This section has examined some aspects of the contentious issue of terminology associated with the field of environmental education, and has provided a justification for the use of the term EfS in this particular research project. The section that follows will explore some of the theoretical foundations of EE and EfS and how theory has shaped the manner in which EfS has been interpreted in policies that apply to schools. It begins with a discussion of the traditional approach to EE.

2.3 The traditional approach to EE

In the traditional approach to EE, there is a basic expectation that educational effort should result in behaviours, known as pro-environmental behaviours, which protect the environment (Gralton, Sinclair & Purnell, 2004; Darner, 2008). The goal of more environmentally responsible behaviour has been defined as:

behaviour that consciously seeks to minimise the negative impact of one’s actions on the natural and built world (eg minimise resource and energy consumption, use of non-toxic substances, reduce waste production) (Kollmuss & Agyeman, 2002:240).

Factors that support pro-environmental behaviour have been identified as entry level variables (activities which predispose people to interest *in* the environment, such as nature experiences, reading books *about* nature); ownership variables (becoming knowledgeable *about* environment and actions *in* the environment) and empowerment variables (including skill in action *for* the environment and belief in success of one’s action) (Chawla & Cushing, 2007).

This traditional approach assumes that if factors such as particular educational experiences that lead to more environmentally responsible behaviour could be identified, then ways of manipulating these factors to bring about the desired goal

could be effected (Kollmuss & Agyeman, 2002; Heimlich & Ardoin, 2008). Whilst knowledge *about* issues is a component of EE (Hungerford & Volk, 1990; Rickinson, 2001), there are no clear links between knowledge acquisition alone and behaviour change (Rickinson, 2001). Many studies have investigated the impact of specific experiences *in* the environment, these being field-based experiences of many kinds (see for example Keliher, 1997; Knapp & Poff, 2001). Although experiences in the environment have been shown to be of varying discernable benefit, they do not necessarily lead to long term behavioural changes (Zelezney, 1999; Rickinson, 2001). To achieve this, EE should include not only experiences in the environment (Zelezney, 1999; Rickinson, 2001) and knowledge of ecology and environmental issues, but also according to Chawla and Cushing (2007) it should engage students in the practice of democratic skills and development of a sense of personal and collective competence in acting *for* the environment.

Chawla and Cushing (2007) list the key actions that environmental educators should undertake to prepare students for authentic democratic citizenship that champions the environment. To achieve this goal, the environmental educator should act as role model and mentor; make time for children to experience and develop bonds with nature; build club activities focused on environment and encourage social networking; encourage discussion of environmental issues; provide opportunities for success in the environmental arena; develop action skills; and involve parents in nature experiences and community projects. The focus of the environmental educator here is care for the environment. Any one or more of these actions can be observed being implemented in Australian schools. Additionally environmental educators whose primary goal is care for the environment are readily found in school systems and in other specialist institutions related to the environment, such as in zoo education departments and through National Parks services.

Traditional EE has been aligned with a behaviourist approach which is criticised on the basis that it assumes it is possible to actually identify responsible behaviours. However, identifying responsible behaviours is problematic, given that the circumstances, and knowledge required to make environmentally responsible decisions are constantly changing, and are often very much determined by local

context (Robottom & Hart, 1993). It is considered that uncontested behavioural goals, that is, what people want others to do, are often inappropriate in local situations, making it difficult for teachers to apply them and thereby engage in effective EE (Robottom, 1993).

2.4 A socially critical approach to environmental education

Critical analysis of societal values in relation to the environment is the key characteristic of EfS and ESD, linking both to the socially critical position. Socially critical inquiry is evident in, for example, Australian and European projects and policies (Henderson & Tilbury, 2004). Example projects include ENSI Eco-schools in 12 member countries in Europe and Enviroschools in New Zealand (Tilbury & Wortman, 2005).

Advocates of a socially critical approach, including Fien (1993a), Robottom and Hart (1993), Posch (1993), Uzzell, Rutland & Whistance (1995), Connell et al.(1998), Gough (1999), Elliott (1999), Jensen (2002), Huckle (2005a) and Breiting (2009) see the environmental problems of our time as a product of the social use of nature and especially of structures developed over time by the powerful to the detriment of the less powerful (Gough, 1999). Amongst the ‘less powerful’ might also be considered the environment itself. It follows that environmental issues invariably involve social or political struggle and logically require the efforts of groups, as well as individuals to contest them (Robottom & Hart, 1993).

A number of authors (including Fien, 1999/2000; Rauch 2002; Uzzell, 1999) have described how the kind of socially critical environmental education that is being advocated challenges the underlying values that are common to our society. These values include the acquisition of material wealth, the view of nature as a resource, and the view of nature as being separate from ourselves (Loughland, 2002).

Robottom and Hart (1993:51) argued, that ‘the main educational aspiration of environmental education ... is the development of independent critical thinking in relation to environmental issues’. Such an approach is in essence socially critical.

According to Gough (1999:8), this kind of environmental education is unlikely to arise within a traditional or behaviourist approach:

A rational scientific approach to environmental education is unlikely to produce a curriculum that encourages just, participatory and collaborative decision making and is sceptical towards global economic rationalism.

Gough (1999) argues that a behaviourist approach is inappropriate because it neither acknowledges nor addresses the underlying causes of environmental problems which have their basis in wealth creation and power.

According to Robottom and Hart (1993) a socially critical approach to environmental education, and thereby EfS, could be characterised by:

- Students gaining environmental knowledge (social and biophysical) in the school through direct inquiry;
- Students practising the skills of values analysis and values clarification in relation to environmental knowledge, and thus developing an understanding of why things are as they are and of how what is regarded as knowledge is problematic;
- Students planning for change in the future taking into account environmental knowledge, social and economic understandings, value positions of those affected and a shared vision for the future;
- Students having the opportunity to implement plans such that they develop a sense of their individual and collective capacity to adapt to and to shape a more sustainable future;
- Students applying their understanding to a global perspective of human use of the environment. Under the tenets of socially critical theory, this should be done in a critical way that incorporates issues of inequity and social injustice.

EfS implemented in this way would aim to develop the skills of critical inquiry and the disposition to use skills of critical inquiry in appropriate contexts (Ernst & Monroe, 2004). EfS as defined by Tilbury (1995), is congruent with the above elements of socially critical environmental education described by Robottom and Hart (1993).

According to Fien (1993a:62), critical environmental education (as with EfS) is 'environmental education that aims to empower people so they can become agents of

change and sustainable development’, meaning that ‘action’, will bring about confidence in the possibility of change (Fien, 2000). Some studies suggest that environmental education without action to resolve environmental problems could be detrimental, heightening students’ action paralysis or sense of disempowerment (Connell et al., 1999; Fien, 2000; Fler, 2002). Students should have the opportunity to actively resolve environmental issues in a democratic way at the local level, firstly so they understand how these issues relate to their own lives and secondly so they are encouraged by the success of their actions (Uzzell, Rutland & Whistance, 1995).

Central to ‘environmental knowledge’ is an understanding of the impact of human activity on ecosystems, of how every person is an integral part of an ecosystem. However, a survey of over 2000 students in NSW schools conducted by Loughland, et.al. (2003) indicated that a significant majority viewed the environment as an object, suggesting that they saw it as something removed and separate from themselves. This is at odds with the view of the environment as something of which individuals are a part and that supports and enhances their lives. Seeing the environment as an ‘object’ puts environmental problems ‘out there’ preventing them from being the focus of everyday concern (Loughland, 2002). Other studies provide further evidence for the view that people are ‘disconnected’ from the environment (Bonnett & Williams, 1998) and this position is in contrast to the conceptualisation of EfS adopted for this study (Tilbury, 1995). This conceptualisation promotes a view of all life as interrelated and aims to encourage learners to explore links between their personal lives and wider environmental concerns.

The advantage of the socially critical position embodied in EfS is that it embraces a broad social and scientific understanding of any environmental issue, with the implication that all factors should be taken into account in the search for more sustainable solutions. Furthermore the socially critical approach, in building capacity for change provides individuals and groups with the flexibility to respond to the immediate local manifestations of environmental issues as well as to the global. Because, as described in a later section (see page 25), contemporary documentation guiding EfS in school education has been influenced by socially critical theory, the

following section will detail criticisms that have arisen since the 1980s and 1990s regarding the application of socially critical theory to environmental education.

2.5 Criticisms of socially critical environmental education

As has been noted, the ideals of socially critical environmental education have been strongly influential on contemporary policy in NSW and elsewhere (Scott & Oulton, 1999). However, the application of socially critical theory to environmental education has been criticised on a number of grounds (see for example Walker, 1995; Robertson & Krugly-Smolka, 1997; Walker, 1997a; Scott & Oulton, 1999; Gruenewald, 2003; Stevenson, 2007). Stevenson (1987:144) maintained that:

While the goals of nature study and conservation education could be relatively easily accommodated in the goals and structural organisation of schools, this more recent critical and action orientation of environmental education creates a far more challenging task for schools.

Robottom and Hart (1993) also anticipated difficulties in the implementation of socially critical theory, as they viewed it as running counter to the institutional practices of schools. Robottom and Hart's (1993) view is shared by Stevenson (2007) who identified the difficulty for schools of challenging prevailing societal values, and by Tilbury (2001:87) who argued that a socially critical approach is grounded in: 'an alternative worldview which challenges many contemporary models of education and schooling'.

Stevenson (2007) also perceived that EfS and ESD, as socially critical environmental education, were being promulgated by policy makers and those attending international conferences, but the theories of practitioners were not being taken into account. Stevenson (2007) argued that practitioners should be invited to contribute to policy and resourcing decisions. In this sense, EfS is leading a particular movement to which not all would subscribe and amongst these would be some teachers. With EfS, the intention is to lead society towards sustainability and specifically not mirror contemporary practice.

Walker (1997a) maintained that for environmental education of a socially critical kind to occur, there needed to be certain conditions operating in the school. These included:

- teachers, students and community participants willing to confront their own values in relation to a recognised, shared problem; and
- teachers willing to adopt a stance where students were given the opportunity to participate in a particular way, such as actively engaging in a process of change in practices in the school.

Walker (1995) also argued that the following practical problems associated with change inhibit implementation of a socially critical approach:

- The ‘for’ the environment, or action, component differentiates it from other curriculum areas and there is an absence of viable strategies for action;
- In three out of the four cases studied by Walker, teachers considered that they had failed to implement school environmental improvement because they had tried to work single handed. While they expected support for their work they did not openly invite others to be part of the process; and
- There is a prioritising of English and mathematics in the school system leaving little time for the teacher’s discretionary use for environmental education or other competing interests.

Under these circumstances it could be easier for teachers simply to overlook environmental education and to channel their energies elsewhere.

Concern has also been expressed about the growing emphasis over time on the sustainability of human futures and the seemingly declining interest, in international policy discourse, in the sustainability of the biophysical world apart from its value for human use. Gruenewald (2003), for example, makes the point that socially critical analysis, whilst emphasising human relationships, generally neglects ecological thinking. However, socially critical environmental education, as described by Robottom (1993), recognises that the environmental ‘crisis’ is cultural, and consideration of the natural environment is also necessary, meaning that both are required. The reason that consideration of the natural environment is necessary is, as Shallcross (2008:140) argued, ‘social and economic systems cannot be sustained if natural systems are unsustainable’. Moreover, there are those who maintain that the natural environment should be conserved for itself. This is broadly the principle of interspecies equity, written into some descriptions of EfS (ADEH, 2005), but which

Fien (2003) argued, can be overlooked in socially critical environmental education. The starting point of conservation of nature for itself is learning to care for nature. Caring and interest are sometimes described as ‘entry level variables’ in environmental education (Chawla & Cushing, 2007) and in their absence, all efforts at conservation and change towards sustainability are without meaning.

This was the point being made by Fien (2003:3) when he argued for maintenance of a better *balance* between ‘social and political engagements with the root causes of unsustainability’ and ‘nature-based approaches’, because for a change in favour of sustainability there needs to be more attention to learning to care for the environment. As part of his vision for EfS, Fien (2003) described an ethic of deep care as comprising a set of values such as responsibility to live lightly on the Earth, to maintain interspecies equity, inter-generational equity and preservation of all life forms. Emphasis on care of the natural environment allows space for a view of environment that recognises the intrinsic value of nature, in contrast to a view that nature is primarily a resource for humanity, and a means towards economic improvement. Only if people care about the environment will they be prompted to act in favour of the environment (Fien, 2003; Noone, 2006) meaning that learning to care is essential in EfS.

2.6 A theoretical divide

The earlier discussion about terms in use has already suggested that the terminology debate represents a deeper division in views of how the field of environmental education should be conceptualised. An ongoing debate in the literature suggests that socially critical and behaviourist approaches to EfS are distinct and fundamentally different. Indeed the behaviourist view of education (where goals are ‘expert’ determined and phrased in terms of ways of bringing about pro-environmental attitudes and actions) is often seen as antagonistic to the socially transformative goals of socially critical EfS (Jickling & Spork, 1998; Gough, 1999; Courtney-Hall & Rogers, 2002; Breiting, 2009). Theoretical approaches to environmental education are relevant because they influence decisions that filter through to schools as curriculum and policy. Curriculum and policy are used by government to influence education, are interpreted by teachers and in turn guide classroom practice.

The acrimonious nature of this polarised debate is demonstrated by remarks from Breiting, 2009:200):

We still see major research contributions in the environmental education research field building on the idea that environmental education is about “manipulating” learners and grownups into becoming individuals exhibiting “correct attitudes and behaviours” related to the environment following a “treatment” or an “intervention” with the necessary tools by the teacher or through an environmental education programme. While the terms used here are deliberately stark, the key issue they articulate is the discrepancy between the idea that environmental education should foster active, critical and independent citizens and other views that position learners as marionettes for the good intentions of environmentalists or environmental educators. A move away from the latter among teachers might already have happened in some countries from a focus on positive attitudes to the environment towards [the] empowerment perspective of the learners.

Breiting’s remarks indicate that for him, there is no compatibility between the assumptions of each position. The basis of his objection to the behaviourist approach is the manner in which that approach positions the learner. For Breiting, and others who share his views, the learner who is positioned as being subject to the advice and goals of others is unable to envision and create a sustainable future.

Adopting an inclusive position

It has been argued that there is merit in drawing upon not just one, but a multiplicity of theoretical constructs, approaches and strategies, when constructing a view of environmental education (Scott & Oulton, 1999; Sauve, 2005; Jickling, 2006; Krasny, 2009), and Sauve (2005) has elaborated the variety of contemporary positions.

In particular, Vare and Scott (2007) invite an inclusive view (of ESD), accommodating the goals of both behaviourist and socially critical positions. For the purposes of this argument, this version of ESD can be interpreted as analogous to EfS. Their reasons for the adoption of an inclusive position are pragmatic and also relevant given that both contribute to a conceptualisation of EfS that is evident in policies, syllabuses and practices in Australian schools.

Vare and Scott (2007) recognise two broad types of ESD, one that provides information and skills that promote behaviours and ways of thinking where the need

for this is clearly identified and agreed (ESD 1). This process may include incentives and penalties for particular behaviours such as for reducing waste or energy use. This is essentially learning to value that which others say is important and is behaviourist in its approach. It can be argued that ESD 1 is necessary for practical reasons, as there are benefits to households and communities from immediate, more sustainable practices (such as waste recycling, conservation of energy and water, reductions in air pollution). It could also be argued that ESD 1 is a practical way forward in the primary school, because very young children are at a developmental stage wherein the knowledge and thinking demands associated with the critical position could be premature (Bailin et al., 1999). It is none-the-less, appropriate for young children to be learning the ways of resource conservation and environmental care. This is ESD 1 and fits with a view of sustainability as being guided by expert knowledge (as well as expert values). However, as mentioned earlier, because the future is unknown, and our knowledge of 'more sustainable ways of living' is problematic, and because today's 'sustainable solution' is likely to be inappropriate in the future, ESD 1 although necessary is not sufficient.

ESD 2 is building capacity to think critically and encouraging people to explore the problematic nature of what is thought of as sustainable living (Vare & Scott, 2007). This is a socially critical approach and is appropriate as children develop as well as in the education of pre-service teachers. The assumption here is that the future is unknown and that the nature of 'global sustainability' cannot be defined. Importantly, the success of ESD 2 cannot be measured in terms of physical environmental impacts because its success relates to decisions that people make in the future in unknown circumstances. The measure of ESD 2 is in the extent to which people have been informed and motivated, and been enabled to think critically and feel empowered to take responsibility.

In this pragmatic way Vare and Scott (2007) have tried to bridge the gap between two theoretical positions that have divided the field internationally for many years. It would appear that ardent proponents of a socially critical environmental education such as Breiting (2009) and Wals and Albas (1997) would find this conciliatory position untenable. However, more recently, Wals (2010:150) has noted, that even

where the socially critical ideals of a participative and democratic way forward hold sway, the urgency to break with contemporary unsustainable systems and lifestyles has tempered this position, with recognition of the need for ‘sustainable social norms and education for sustainable development as a destination’ as in the behaviourist tradition.

2.7 Theoretical stances and Australian policy initiatives

Relevant to schools across Australia, *Educating for a Sustainable Future: A National Environmental Education Statement for Australian Schools* (ADEH, 2005) describes a style of education compatible with Robottom and Hart’s (1993) conception of a socially critical approach, in the sense that it advocates collaborative inquiry into local issues, and values a school management process that exemplifies more sustainable practices. Additionally, the *Environmental Education Policy for Schools* (NSW DET, 2001a) fits within the conceptualisation of EfS provided earlier (Tilbury, 1995) as indicated through its objectives (discussed in Appendix 2.1). Through this policy, schools are encouraged to engage students collectively in the processes of examining the value positions associated with society, economy and environment and to be active in building local environmental knowledge; planning; and bringing about change in favour of sustainability. The policy environment of schools is intended to be further shaped by two more recent national documents (AGDEWHA, 2009; ARIES, 2009) that are also influenced by socially critical theory (again see Appendix 2.1). As well there is pressure from Australia’s professional organisation for environmental educators (AAEE, 2009) to shape EfS in a socially critical way, but with different points of emphasis from those in the former documents (in Appendix 2.1).

2.8 Some approaches used to implement EfS

Policy, teaching approaches and teaching resources have been developed that adopt and potentially operationalise socially critical environmental education in contemporary EfS. One key teaching approach is curriculum integration, which allows holistic investigation of environmental issues (Tilbury, 1995). Curriculum integration is central to several approaches described below, including the whole school approach, the action competence model and various modes of experiential

learning. For this reason, this section begins with a discussion of curriculum integration.

EfS and curriculum: integration

Integration of curriculum can occur in many ways and can be thought of as a continuum. At one end of the continuum is a situation where a topic is central to learning and there is little regard for discipline divisions. At the other end a single topic is taught through several disciplines but the integrity of each discipline is maintained and there is little integration of curriculum (Kysilka, 1998).

One fundamental reason why some form of integrated approach to curriculum is suited to EfS is the nature of EfS itself. Essentially EfS, being holistic and issues-based, draws upon more than one discipline. Additionally, one important aspect of EfS is the essential capacity to assess critically the sustainability of everyday practice and to do so is to draw upon all disciplines. A curriculum-integrated, holistic focus on environmental issues allows an informed and critical stance to be taken.

In NSW teachers are directed by policy to include EfS in curriculum in an integrated way as illustrated in Appendix 2.2. Such a stipulation conceals assumptions about what integrated curriculum actually means, about what is possible given the constraints of schooling, and about the capacities and desires that teachers bring to the task, not to mention teachers' skills in integrated curriculum construction.

Specifically, the NSW *Policy on Environmental Education for Schools* (NSW DET, 2001a) directs teachers to (a) address outcomes specific to environmental education in Key Learning Area (KLA or major subject area) syllabuses; (b) integrate environmental education topics and issues to support outcomes in other syllabuses, and (c) to 'use the opportunities provided by special events and school community actions to enhance those student learning outcomes related to environmental education' (NSW DET, 2001a:12). As an example of (b), it has been shown that EfS integration into English can be far more sophisticated than using environment-related content and can contribute to a 'pedagogy of responsibility' (Reid, 2007:118). Whilst (a) and (b) appear to imply that the integrity of the disciplines need not necessarily be

challenged by the teacher's approach to EfS, (c) suggests that a more holistic approach could be taken. In (c), the event or action can become the focus of integrated learning across Key Learning Areas and draws on the various objectives of the NSW *Policy* (NSW DET, 2001a). Learning associated with an event or action allows for a greater departure from a fragmented and discipline-based approach because students become deeply engaged in projects that matter (for examples see Comber, Nixon & Reid, 2007) as is suggested should happen in terms of EfS defined for this study (page 12). Without diligence in application the curriculum integration strategies proposed in the NSW *Policy* could fall far short of, for example, the more transformative position of AAEE that 'sustainability needs to be the organising logic for learning and curricula in schools' (AAEE, 2009:1). The overall benefits of an integrated approach to curriculum are well recognised. An integrated approach, for example, accommodates genuine learning in meaningful and purposeful activity; facilitates authentic assessment tasks (Kysilka, 1998; Queensland State Education, 2004); and through purposefulness advances student engagement (NSW DET, 2006; Skamp, 2009).

The 'across-curriculum strategies' required by the NSW *Policy* (NSW DET, 2001a:12) lie at various points along the continuum of integration described by Kysilka (1998). For this reason, although the general term 'integrated' will be used, it should be understood as consisting of these three forms as far as this study is concerned.

However problems have been identified with the integration of curricula in general (Kysilka, 1998; Applebee, Burroughs & Cruz, 2000) and with the across-discipline nature of EfS in particular (Stevenson, 1987; Summers, Corney & Childs, 2005; Wallace et al., 2007). Reasons for limited use of an integrated approach include the following:

- teachers are anxious that if they use an integrated approach their students may not achieve as well as otherwise on standardised tests (Kysilka, 1998; Stevenson, 2007);
- additional time is required for teachers to plan an integrated approach (Kysilka, 1998; Gayford, 2000);

- parents may be resistant to a less discipline based approach (Kysilka, 1998);
- teachers may lack confidence in their breadth of content knowledge and ability to teach in an integrated fashion (Kysilka, 1998); and
- an integrated approach may not have been demonstrated during teacher education (Kysilka, 1998).

Because EfS is conceptualised as holistic and curriculum integrated, any one of these impediments could limit the efficacy of EfS implementation.

In addition, curriculum integration could easily be interpreted by teachers only as ‘using the environment as a vehicle for teaching something else’ such as language or mathematics. Of course this is a fundamental teaching strategy in EfS, but is of itself insufficient for EfS. Using the environment as a vehicle for teaching something else is a valid interpretation of the NSW *Policy* requirement that teachers should ‘integrate the teaching of environmental topics and issues to support outcomes in other syllabuses’ (NSW DET 2001a:12). The difficulty is that using this strategy alone could result in the implementation of EfS as a series of ‘ad hoc or disassociated learning experiences that occur in unplanned ways’, and thus be regarded as inadequate for preparing students for a more sustainable future (Butler, 2009:8).

This section has discussed how integration may be interpreted in relation to EfS and why an approach that integrates EfS across disciplines seems in many ways appropriate. It has detailed how this might be achieved in NSW, as well as suggesting both practical and philosophical impediments to EfS as integrated curriculum in schools. The implication of this discussion is that if beginning teachers are to effectively implement EfS, as described, then they need to be competent in planning and implementing an integrated EfS curriculum. Another implication is that if for any reason teachers do not integrate, then the implementation of EfS is compromised since it is not a KLA in NSW.

EfS and the whole school approach

A whole school approach to EfS (Henderson & Tilbury, 2004; Tilbury & Wortman, 2005; Scott, 2007) can be one way to address several of the difficulties associated with socially critical environmental education as identified by Walker (1995, 1997a,

1997b). This approach involves the school community collectively examining its curriculum and management practices in the light of sustainability. Here school communities are encouraged to draw upon the school itself as a physical and social entity, one that constitutes a rich resource for learning. As noted above, the whole school approach is central to the NSW DET *Policy* (2001a) where the anticipated change towards sustainability is organised through practical procedures described in a School Environment Management Plan (SEMP). This plan (NSW DET, 2001b:17) affords a socially critical approach to environmental education as it describes a process of questioning existing ways of doing things, is collaborative, investigative, student active and organised around environmental issues (Appendix 2.3), and could be interpreted in a way consistent with the Tilbury (1995) definition of EfS. The SEMP process encourages the development of an environmental ethic through its focus on managing the school in a more sustainable way. Moreover, it is intended that through the SEMP, students are practising the processes of improved sustainability as a co-ordinated and integrated part of the formal curriculum.

In this way the SEMP directly addresses Walker's criticisms of socially critical environmental education by providing a structure that draws teachers together, prompting recognition of common problems and facilitating the participation of students in change processes. The SEMP is thereby a practical tool supporting a whole school approach to EfS. A whole school approach, however, would rely heavily on cooperation and communication in schools, strong and sympathetic leadership and high levels of awareness and accord on the part of individuals, regarding their role in the whole school endeavour. Later sections will report on implementation of the whole school approach in Australia and more particularly in NSW. Immediately following is a discussion that addresses Walker's (1995) criticism regarding the action component of socially critical education.

EfS and the 'action component'

Walker (1997a) suggested that the notion of 'action' should be reformulated to take into consideration constraints that teachers encounter. The core business of teachers is curriculum and therefore one implication is that if strategies for including 'action' are to be viable, then they should be curriculum relevant strategies. Co-ordinating the

action component with the curriculum planning aspect of a whole school approach can be accomplished with the use of a model for curriculum planning such as the one developed by Jensen, (2002) as presented in Appendix 2.4.

As with other proponents of a socially critical approach, Jensen (2002) argued that the goal of environmental education should be to educate students to become critical and active citizens. Jensen called this ‘action competence’. This is where the action is a component of a teaching strategy and should be decided upon by those preparing to carry it out. Action can therefore be individual or collective, direct or indirect. Jensen’s ideas represent a reformulation of the notion of action and have been further developed and adapted by Wilson-Hill, Law and Eames (2008) into a detailed and useful teaching framework.

Student action is thought to be significant because young people can become frustrated by learning *about* environmental ‘problems’ resulting in a situation of ‘learned helplessness’ (Uzzell, Rutland & Whistance, 1995; Cross, 1998; Yencken & Fien, 2000). For example, in a situation reported by Summers, Corney and Childs (2003:336) where ‘learned helplessness’ had been observed, teachers aimed to ‘make children feel they could take action and “make a difference”’. Although the actions taken by children in the case study lessons were quite minor from an adult perspective, the teachers felt that these were developmentally appropriate in that they were ‘adequate to convey a message of empowerment’, and addressed the ‘learned helplessness’ (Summers, Corney & Childs, 2003:337). The point being made is that developmentally appropriate action can be effective even though not undertaken on a grand scale and, in this example, there was no evidence that identifying and building such actions into teaching was problematic.

A further example of pedagogical practice that demonstrates how action can be a part of integrated EfS is known as Learnscaping (Appendix 2.5). Learnscaping, which has an international following, provides a special form of learning in the environment (Skamp & Bergmann, 2001; NSW DET, 2001a; ADEH, 2005; Skamp, 2009). A learnscape is a feature, such as a garden usually in or near a school yard with which children can interact, and is used during learning programs designed to meet the

objectives of various KLAs and of EfS. Learnscaping can also cohere with the intentions of the SEMP including involving students in the design and construction of the learnscape.

EfS and learning to care

Fien (2003) argued that caring for the environment had been overlooked in the theorising of socially critical environmental education but that it is in fact essential. Development of an 'ethic of care' is a part of Tilbury's (1995) definition, which describes EfS as involving teaching about values but also teaching values. In primary school it is also about encouraging young people through their experience of nature to construct an understanding of the environment and to feel *a part of* the biophysical world (Loughland, et al., 2003). Some argue, that in contemporary urbanised societies such as Australia, children are increasingly distanced from the natural environment in their everyday lives (Malone, 2007) and therefore the intentional development of a sense of care for, and belonging to, the biophysical environment is more important than ever before.

Caring is enhanced by positive experiences *in* the environment (van Matre, 1990) and is considered fundamental to the development of empathy with environment in place-based education (Gruenewald, 2003; Smith, 2007) (Appendix 2.5). The idea that experiences in natural places can lead to a closer sense of relatedness to the self and a greater propensity to care for the environment is cogently argued by Martin (2007) and reported by others (Keliher, 1997; Knapp & Poff, 2001; Gascoyne, 2007; Ballantyne & Packer, 2009). Learning to care can also occur through rich experiences with particular kinds of literature that capture the imagination and make natural environments and our human relationship with natural environments accessible to people.

In this section, several approaches have been offered as a means of negotiating, or overcoming, constraints to socially critical environmental education originally identified by Walker (1995; 1997a). They include adoption of a whole school approach; following of an integrated curriculum; use of an action competence model of curriculum integration; inclusion of various modes of experiential learning such as

learnsourcing and place-based education (Smith, 2002; Gruenewald, 2003); and attention to values inherent in EfS, notably learning to care. Walker's (1995; 1997a) criticisms of socially critical environmental education in terms of teacher interests and abilities will be discussed in a later section related to teacher education (page 39).

The following sections are about the implementation of EfS in Australian, and particularly NSW, schools. The discussion about implementation draws on the background provided above and is particularly relevant to this project. This is because the policy framework, available resources and the normal practices of schools are a part of the context within which teachers make decisions, and it is teachers who shape the learning experiences of the students in their care. Of particular interest are those influences which shape teacher decision making with regard to EfS.

2.9 EfS practice in Australian schools

At the national level, the non-mandatory document, *Educating for a Sustainable Future: A National Environmental Education Statement for Australian Schools* (ADEH, 2005), is intended to influence EfS in all schools across Australia. However, the status of EfS varies greatly nation-wide, generally remaining the domain of dedicated enthusiasts within schools, seldom becoming the focus of whole school communities (Tilbury, Coleman & Garlick, 2005). State governments are responsible for curricula, and these do not necessarily facilitate EfS. Whilst the general nature of some state syllabus learning outcomes provides teachers with opportunity to include environmental issues and sustainability within KLAs such as English, health education and the arts, aspects of EfS occur predominantly in science and social science. Student action and the development of action competencies, is rarely evident in Australian state curriculum prescriptions (Tilbury, Coleman & Garlick, 2005).

State governments are responsible for curricula. However the national government through the Australian Curriculum Reporting and Assessment Authority (ACARA) has recently adopted an unrelenting stance on nation-wide testing of students in primary Years 3 and 5 in English and mathematics (ACARA, 2009) and this has been accompanied by the concomitant publication of schools' performance. This initiative followed more than a decade of such testing in NSW. This practice has been adopted

in several countries and has the effect of entrenching the prioritisation of mathematics and English (Dworkin, Saha & Antwanette, 2003) and reducing attention to other aspects of the curriculum (see for example Parlo & Butler, 2007). Making teachers and schools accountable for their work on the basis of comparisons of student performance on these tests, between schools, and over time within schools, further distances EfS from schools' primary concerns (Stevenson, 1987; Dworkin, Saha & Antwanette, 2003; Gruenewald & Manteaw, 2007; Stevenson, 2007).

Standards-based pedagogies and frequent routine measurement of student and school success in tests of literacy and numeracy skills not only entrench a sense of individualism contrary to the principles of EfS, but can frustrate the process of inquiry and action. The testing regime is seen as a means of gearing schools to the needs of the growth economy (Stevenson, 1987; Gruenewald & Manteaw, 2007; Stevenson, 2007) and tension arises because EfS challenges the associated, commonly held, underlying values regarding wealth and resources (Uzzell, 1999; Fien, 1999/2000; Rauch, 2002; McLeod, 2007; Taylor & Kennelly, 2007). At a school level socially critical environmental education necessarily involves teachers, students and community participants in confronting their own values in relation to shared environmental problems (Walker, 1997a) including the unrelenting pursuit of wealth. People working in schools may wish to avoid tensions associated with this or not even see this as an issue. These fundamental tensions have significance within the context surrounding beginning teachers whether they are consciously aware of them or not. They help to explain why the introduction and institutionalisation of EfS into schools is challenging.

There has been no published data on the extent of implementation of EfS at the national level since 2005. However contributions by schools to the Australian Sustainable Schools Initiative (AuSSI) website (AGDEWHA, 2007) suggest interest amongst schools. In particular the AuSSI website provides case study reports of outstanding environmental projects in individual schools from every state.

2.10 EfS practice in NSW schools

EfS in NSW should be driven by the *Environmental Education Policy for Schools* (NSW DET, 2001a). This mandatory policy, with its accompanying practical implementation book, makes tangible efforts to provide practical assistance to teachers. The policy is itself in many ways an advocate for socially critical activity (see Appendix 2.1) and therefore the criticisms offered by Walker (1995) and others may apply to its implementation. The value of policy is that it is an expression of government, and even cultural priorities which schools are expected to uphold. Policy may also be useful to those promoting environmental education in so far as schools may be held accountable for policy implementation. The policy can be used by environmental enthusiasts to provide leverage and to justify inclusion of EfS in both schools and in teacher education courses where competition for inclusion is often severe. Elsewhere it has been reported that teacher educators have felt disadvantaged in their efforts to include biodiversity education for primary pre-service teachers by a *lack* of supportive national policy (Lindemann-Matthies, et al., 2009).

The NSW DET *Policy* (2001a) was made available to schools over eight years ago, but, as will be shown below, does not appear to have been implemented in a robust way. Delivery of change through policy imposed from outside the school can be expected to have limited impact. Dinham (2001) reported that teachers, in a climate of increasing workloads, are dissatisfied with imposed educational change. Their greatest work satisfaction comes from the core business of facilitating student achievement and from feeling part of a collegial and supportive environment. With increases in school responsibilities, teachers are less willing to take on the extra out of class roles which can have value in making schools so rewarding for teachers and students. In particular teachers were found to dislike attempts to induce collaborative relationships, especially those directed at ‘extra work’ on committees or teams over and above classroom work (Dinham, 2001). This does not auger well for aspirations towards whole school EfS that require people to meet, discuss, plan and then carry out particular activities which may be beyond normal practices or which they may regard as beyond core business. However, if core business is characterised as learning organised around intellectual quality, of significance to the lives of students in an

engaging learning environment (NSW DET, 2003) then EfS could well be construed as ‘core’ business.

When required to make syllabus changes, teachers may well respond by adapting current teaching programs, modifying, rearranging and adding to as necessary. Teachers have been found to adopt a discretionary approach to change (Panizzon, Barnes & Pegg, 2007) and new teachers may readily adopt this aspect of the culture of the school as they acclimatise to the workplace. The implication is that ‘transformative’ aspects of EfS may be approached cautiously by teachers, thus adding to the notion that change would be slow. There is also the implication that any ideas for change in favour of EfS would need to be well articulated in terms of how EfS can be of advantage to the existing interests and values of the school. Furthermore, where teacher teams are cautious in adopting change, it may be that attempts at revolutionary or radical change towards EfS could meet with more resistance than an approach that appeared to be more consistent with existing practice. Such a proposition is compatible with the findings of Grace and Sharp (2000) and Ernst (2009).

The above reports suggest that the social dynamics of schools are complex, and this complexity influences the potential for uptake of a policy that is designed to influence curriculum. The point being made is that schools are social entities comprising people with values and opinions, some more influential than others, and that the school itself is a part of a larger social system that tends toward conservatism in the sense of maintaining the status quo. Social complexity has relevance because of the ways in which this aspect of the workplace provides opportunities, or impedes the activities of the early career teacher in EfS.

There appears to be no documentation that reports on the efficacy of policy *per se* in furthering the implementation of EfS in NSW schools. However some measure of the degree of success of the policy comes from several initiatives. As mentioned above, both the whole school approach (and the associated SEMP) and the adoption of integrated curriculum focused on the environment are advocated through the NSW DET *Policy* (2001a). Neither appears to have gained a strong following. The first

imperfect, but partial, measure of policy implementation comes from data associated with the adoption of the SEMP as a tool of whole school environmental planning. Approximately one quarter of NSW schools have prepared a written SEMP using the facilities of the Sustainable Schools website (NSW DECC & NSW DET, 2006). However preparing a SEMP and carrying it out may be quite different things.

The second, albeit part measure of policy implementation, comes from a report of the Sustainable Schools Program (SSP) (Funnell & Larri, 2005; Larri, 2006) referred to in Appendix 2.6. This report revealed that, whilst participating schools made considerable progress in EfS in terms of resource use, grounds management and waste reduction, there was much slower progress in relation to curriculum integration. This could be expected from the arguments above. This latter outcome in particular was the basis of a recommendation by Funnell and Larri (2005) concerning professional learning for all teachers but targeting pre-service learning in particular as a means to improved implementation.

Professional learning for teachers was also recognised, from an international review of whole school approaches, as critical if whole school implementation is to occur (Henderson & Tilbury, 2004). Henderson and Tilbury (2004:23) observed that:

Many teachers are keen to engage with EE and EfS and indeed already use the terminology. However, all the programs reviewed explicitly recognised that few teachers have the knowledge and capacity to develop EE or EfS in schools.

They also acknowledged that while the programs invest in professional development of teachers and see this as a critical component, the professional development is:

mostly focused on raising awareness and improving the EE knowledge of teachers. Increasingly programs are recognising the need to target the development of skills associated with participatory pedagogies - aligned with EfS (Henderson & Tilbury, 2004:24).

These summary statements by Henderson and Tilbury (2004) support the findings of Funnell and Larri (2005) in NSW and are significant because they imply that it is easier to deal with awareness raising and improving knowledge than with developing the skills of participatory pedagogies, therefore suggesting that the former are more readily offered. The findings further imply that maybe the process of professional learning required is not only more complex but slower than anticipated. In terms of

the present research, these findings suggest that in pre-service teacher education, far more is required than awareness raising and improvement of knowledge.

While Funnell and Larri (2005) identified slow progress of curriculum integration of the schools' environmental activities, a small number of NSW schools have achieved integration through, for example, learnscaping as a component of a whole school approach (Skamp & Bergmann, 2001; NSW DET, 2001a; ADEH, 2005; Skamp, 2009). Skamp's (2009) study of a learnscape school concurred with the work of Funnell and Larri (2005) in recognising the need for professional learning regarding the wide curriculum potential of environmental projects. Skamp's study showed how learnscaping became a valued part of 'core business' for teachers in the school but to a varying extent depending upon the skill and interest of individual teachers. In particular, Skamp (2009) concluded that teachers needed to be challenged to consider how the learnscape could be used as a vehicle for critical learning activities, such as students critiquing their own local landscape. In the absence of some form of learnscaping or place-based education within the curriculum of the school, the rich resources of the school yard and immediate environment can remain underutilised and the potential for contextually rich and significant learning underexploited.

A particularly successful example of curriculum integration in NSW, and other states sharing the watershed of the Murray Darling River system, comes from the *Special Forever* primary school writing project (Comber, Nixon & Reid, 2007), described in Appendix 2.6. There is a clear congruence in the *Special Forever* project with the purposes of EfS, including development of an ethic of care and critical appraisal of relevant practices. The project has the added advantage that it demonstrates how EfS can become an integral part of the English curriculum. The *Special Forever* writing project is relevant because it provides an example of how EfS can be implemented into schools and how difficulties associated with socially critical environmental education can be overcome by highly skilled and enthusiastic teachers.

In NSW, environmental education is supported not only through policy, web tools, print resources and special state-wide projects such as the SSP, but also through a network of Environmental Education Centres (EEC) whose role is set out in Appendix

2.6. The significance of much of the work of the EECs, and state-wide projects with the resources they have provided, is that they have potentially conveyed to schools and teachers a particular approach to EfS. Amongst other methods, they have provided the tools of a collaborative and active approach to EfS. The EECs, as a key element in this overall effort, have been used as an instrument of policy implementation. Current studies that report on their impact in regard to policy promulgation are needed. However the considerable reliance on the EECs for this purpose has meant that the process is dependent upon the interpretation of EfS and of policy held by EEC personnel, as well as their capacity to influence day to day teaching in schools willing to work with them.

Whilst implementation of socially critical EfS has met with variable success, more traditional elements of EE appear to be commonplace in many NSW primary schools. As an example, stories of nature are embedded in children's literature and are a familiar part of everyday schooling. They teach children about the environment and encourage an attitude of care. Similarly it seems outdoor work is programmed into the curriculum of many schools in NSW as well as other places such as New Zealand (Eames, Cowie & Bolstad, 2008). Primary age children commonly express an inherent interest in and concern for the natural world (Myers, Saunders & Garrett, 2004) and this interest is readily exploited by teachers for any number of educational purposes. This expression of traditional EE can be valued rather than disregarded. The successes and traditions of schools in EE represent the roots of environmental concern, and can serve as building blocks upon which EfS can grow.

As indicated, from NSW there are some specific reports of policy implementation. As Stevenson (2007) predicted, there are Australian examples where the school's challenge to common societal values in relation to the environment, and the school's use of student active pedagogies, have aroused community complaint (Whitehouse, 2001; Smith & Cupitt, 2007). However there are also examples of community support and transformative pedagogies, much of it anecdotal, and some reported in the literature (Comber, Nixon & Reid, 2007) in NSW schools. It appears that Walker's remark that EfS is often the work of enthusiasts in a school appears valid. However, the examples of students actively engaging in change processes (NSW DECC & NSW

DET, 2006; Smith & Cupitt, 2007) and examples of excellent curriculum integration of EfS (Comber, Nixon & Reid, 2007) show progress is being made. It seems there is evidence that the kinds of support made available and the determination of particular individuals and communities have led to positive, albeit inconsistent, implementation of a somewhat socially critical environmental education policy in NSW schools. A way forward may be for teacher education to highlight and build upon these successes.

2.11 Teacher education

Teacher education is perceived as a means of enhancing future sustainability (Tilbury, 1992; UNESCO, 2004; Ferreira, Ryan & Tilbury, 2007b). However there are many obstacles to the efficacious execution of pre- and in-service teacher education in EfS. Walker (1997a) maintained that for socially critical environmental education to flourish, there needed to be present teachers committed to EfS and teachers willing to adopt a stance where students were given the opportunity to participate in a particular way, such as actively engaging in a process of change in practices in the school. Additionally, Walker (1995) claimed that teachers lacked confidence in their ability to question and change prevailing conditions in their schools, and practitioners considered that environmental education requires specialist knowledge. Teachers are central to EfS in schools and each of the above conditions implies teacher attributes that Walker considered would be necessary for implementation of socially critical environmental education. Each condition is discussed below.

Official definitions and debates about what should and should not be a part of EfS can leave practitioners with no clear idea of what they might actually do, or what content they should include in their work. In particular, if teachers are to implement EfS, then the principles and concepts fundamental to EfS need to be an accessible part of teacher education curriculum and modelled in pedagogical practice (Stevenson, 2007). Such concepts may not necessarily have been a part of teachers' general education and, without specific planning on the part of the tertiary teacher education provider, would not be a part of pre-service teacher education.

Hart (2003:73) reported that most primary teachers with whom he worked held positive values about the natural environment, feeling that environmental care was 'the right thing to do. They somehow connect environmental education activity to this belief system, a value position embedded in an ethic of caring'. An expression of care falls far short of an active socially critical approach to environmental education but, none-the-less, the latter is unlikely to occur unless teachers do care. There are examples of teachers who do give students opportunity to participate in a critical and active way (Whitehouse, 2001; Comber, Nixon & Reid, 2007). The important question is, how can teachers be encouraged and supported to move from a position of care to one of actively seeking ways of incorporating EfS into their day-to-day work?

There are barriers to this position. The teacher's own beliefs and values may be counter to the value laden goals of EfS (Walker, 1995) or the teacher may believe that a values neutral position should be held (Cotton, 2006). There are teachers who lack confidence in their ability to question and change prevailing conditions in their schools (Jenkins, 1999/2000); those who feel anxious about taking students out of doors (Simmons, 1998); and teachers have expressed a strong need for the support of their principal and colleagues for their EfS efforts (Kennelly, Taylor & Jenkins, 2008). Challenges can only be expected, in an educational endeavour that has been described as 'transformative' (Robottom & Hart, 1993), and which in many practical ways questions everyday expectations and routines of school. Once again the important question is how can teachers best be assisted in their endeavours, such that they can build confidence in their skills to adopt EfS.

As noted there are reports that teachers considered environmental education required specialist knowledge and this perception inhibited their efforts in EfS (Walker, 1995). Certainly many studies indicate that teachers do not hold the knowledge and understandings deemed necessary for implementing EfS. These include reports that teachers may lack understanding of the fundamental ideas and practical procedures underpinning EfS (Dove, 1996; Robertson & Krugly-Smolka, 1997; Skamp & Bergmann, 2001; Summers, Corney & Childs, 2003; Taylor, Nathan & Coll, 2003; Kennelly, Taylor & Jenkins, 2008; Skamp, 2009; Yavetz, Goldman & Pe'er, 2009). Others suggest that teachers may lack understanding of environmental concepts

(Summers et al., 2000; Khalid, 2001; Cutter-Mackenzie & Smith, 2003; Flogaitis, 2003; Summers, Corney & Childs, 2004, 2005; Zemits, 2006; Parlo & Butler, 2007; Zak & Munson, 2008; Skamp, 2009). As an example, with reference to teachers' use of learnscapes, Skamp (2009:103) concluded that:

Teachers will not engage students in a wide variety of environmental learnscape activities if they are unaware of the environmental knowledge associated with the cognitive outcomes from those activities ... Awareness of general and abstract environmental knowledge may not be sufficient ... Explicit professional development workshops focusing, in part, on specific content knowledge about particular learnscapes, might address this issue.

The inference is that the pedagogy of EfS, and the social and ecological understandings deemed necessary, may have been missing from teacher preparation, or where they have been included, they may not have been offered in such a way as to allow, or to motivate, teachers to apply them in their own context. Including such concepts in teacher education would be entirely compatible with the Draft National Professional Standards for Teachers (2010) in Australia. As an example, lead teachers planning for effective teaching and learning should be able to 'guide colleagues to support students' interaction with local, national and global communities through ... real environments'. Lead teachers also should 'know about Australia, its history, environment and people ... and how to support others to use this knowledge in the context of their teaching' (NSW Government and NSW Institute of Teachers, 2010: Standards 2.9 and 3.4). It should be noted that whilst the social and ecological understandings deemed necessary for those engaging with EfS may be compatible with the standards mentioned, the standards are written such that they need not be interpreted in the way that proponents of contemporary Australian policies in EfS would interpret them: meaning they do not explicitly mention EfS.

For this study, the significance of a lack of familiarity with EfS concepts and skills amongst teachers is that early career teachers are likely to enter schools wherein there are colleagues who do not share their understandings of the nature and pedagogical implications of EfS. Many of these colleagues may be placed, formally and informally, as mentors for beginning teachers.

Although comprehensive information is not available, at the international level it appears that programs of EE, ESD and EfS are offered by only a limited number of

teacher education providers, as a part of initial teacher education (Lane et al., 1995; McKeown-Ice, 2000; Powers, 2004; Mastrilli, 2005 in USA; Ferreira, Ryan & Tilbury, 2007 in Australia; Beckford, 2008 in Canada; Lindemann-Matthies, et al., 2009 in four European countries; Yavetz, Goldman & Pe'er, 2009 in Israel). Firth and Winter (2007:600) for example, maintain that the opportunity to educate future teachers in ESD has 'not yet been widely taken up in England because there are no statutory requirements to address sustainability, and teacher certification guidelines rarely mention it'. The following section illustrates existing teacher education in EfS, ESD and EE.

Teacher education initiatives in environmental education: matters to consider and lessons to be learnt

Teacher education, in what is termed ESD, is accessible through the internet (UNESCO, 2002; Moray House School of Education at the University of Edinburgh and Institute of Education at Manchester Metropolitan University, 2005). It has been suggested that the *Multi-media Teacher Education Programme* (UNESCO, 2002), currently being updated (email communication, John Fien, 3.6.09), tends to be used internationally by teachers already interested in ESD but has not brought about a general reorientation of initial teacher education towards ESD (Ferreira, Ryan & Tilbury, 2007b). Additionally the *Sustainability Education in European Primary Schools* program (Moray House School of Education at the University of Edinburgh and Institute of Education at Manchester Metropolitan University, 2005) is amongst those which, it has been claimed, have not been evaluated in any effective way thus limiting their usefulness for others wishing to adopt their suggested approach (Ferreira, Ryan & Tilbury, 2007b). Whilst these readily available programs provide useful resources for teacher educators in EfS and insight into others' conception of ESD in teacher preparation, they are written for a general audience and may have limited application to localised teacher education programs (Stevenson, 2007). Indeed in official recommendations, such as those by UNESCO in *Guidelines and recommendations for reorienting teacher education to address sustainability* (UNESCO, 2005), there are claims that ESD should be locally relevant and culturally appropriate.

It has been suggested that the vision of EfS presented to pre-service teachers and teachers should be carefully considered. This is because pre-service teachers may feel constrained from delivering EfS inclusive of change aspirations, as delivered by university teacher educators, into a school context where EfS does not appear to be appropriate (Bore, 2006; Firth & Winter, 2007; Cherubini, 2008) or even welcome. In an attempt to overcome disparities between the vision of EfS promulgated by the university and the reality of school life, Grace and Sharp (2000) first surveyed schools to find those practices, described as environmental education, most acceptable and most commonly practised in schools. Pre-service teachers were successful where they used acceptable rather than less popular components of environmental education in schools. For Grace and Sharp (2000:343):

The immediate task faced by teacher training partnerships is to ensure that teachers enter the profession with the ability to deliver EE as effectively as possible within the curriculum frameworks of their own schools.

However this expedient view may be considered myopic. With reference to ESD, Firth and Winter (2007:614) claimed that:

Compliance with Government policy in our work with student teachers does not meet our responsibility for their educational preparation for up to 40 years of professional service, across which Governments and school curricula will, no doubt, change many times, as will the state of knowledge and the nature of the world in which we live.

In their approach Firth and Winter (2007) encouraged pre-service teachers to develop a strong conceptual framework incorporating the nature and purpose of their work, ESD in curriculum, and the best learning and teaching approaches to use.

Programs of teacher education which are contextually relevant, in the sense of taking account of the pressures to cover a broad curriculum through providing a curriculum integrated view of EfS, have met with some success. As an example, Gough (2004a) reported a teacher education program that emphasised the integration of EfS into science teaching, thus making a space for EfS in the 'overcrowded curriculum' of schools. This example supports the curriculum integration procedures described earlier from the NSW *Policy* as integrating 'the teaching of environmental education topics and issues to support outcomes in other syllabuses' (NSW DET, 2001a:12).

Outcomes of professional learning programs are a function not only of the subject material and mode of presentation but also of the personal aspirations that teachers bring to or adopt from them. An example is the finding in an in-service situation, that there is a connection between three factors contributing to teacher understanding, and uptake of environmental education: motivation for environmental education, values for the environment and accessibility and use of resources (Lang, 1999/2000). However, whilst personal aspiration is acknowledged as important, Miles, Harrison and Cutter-Mackenzie (2006) reported that pre-service teachers, although keen to incorporate EfS in their future profession, felt they did not have sufficient knowledge to do so. Content knowledge as well as values, motivation and good resources appear to be relevant.

Pre-service teachers place high value on practical teaching skills within their pre-service education (Lindemann-Matthies, et al., 2009). In Switzerland where practical teaching skills were prioritised in primary pre-service education, students felt confident to teach biodiversity studies in school and felt that it was their own responsibility to learn subject matter independently. In a contrasting approach in other institutions, where the emphasis was on theory or subject knowledge, rather than the skills of teaching, students felt unable to teach biodiversity in school (Lindemann-Matthies, et al., 2009). Others have identified that an emphasis on practical teaching skills in pre-service environmental education has been associated with greater confidence in teaching (Grace & Sharp, 2000; Moseley, Reinke & Bookout, 2003). Given the aspirations of EfS as being localized, student directed, active and incorporating co-operative learning it would seem that there should be particular emphasis on practical teaching skills, as well as on conceptualisation of the visionary change aspirations of EfS.

EfS is a new field of study, having been recognised as such only within the last three decades and having undergone some transformation in its conceptualisation during that period of time. Of course the primary issue for teacher education is that EfS is largely absent. This section has indicated that matters to consider in teacher education in EfS include whether teacher education in EfS should be pragmatic or visionary or both, what pedagogical approaches should be used and encouraged, what might

contribute to teacher motivation and confidence, how much and which subject knowledge is required and what kind of official teacher competencies should be developed.

The extent of EfS in teacher education in Australia

Environmental education in Australian schools has been limited by:

a dearth of teacher education programs in EE, [which] has resulted in a lack of competencies amongst teachers to effectively teach EE in schools (Tilbury, Coleman & Garlick, 2005:49).

Certainly little or no training in environmental education at both pre and in-service levels was reported by 84% and 78% respectively of practising teachers surveyed by Cutter-Mackenzie and Smith (2003) in Queensland. More recently, less than one third of pre-service primary teachers at a NSW university attributed their environmental knowledge to their university teacher education (Miles, Harrison & Cutter-Mackenzie, 2006).

EfS has been found as small components of courses in social science or science. This reflects subject boundaries, and potentially limits pre-service teachers' understanding about the interconnectedness of issues of environment, society, economy and politics and the implications for EfS (Tilbury, Coleman & Garlick, 2005). As an example, where pre-service primary teachers at a NSW university did report exposure to EfS during teacher education, it was primarily from the social studies and science curriculum areas (Miles, Harrison & Cutter-Mackenzie, 2006). As suggested by Tilbury, Coleman and Garlick (2005) the providers seemed to deal with environment, but in a piecemeal or uncoordinated way despite the existence of state policies and national statements describing integrated EfS in schools.

Tilbury, Coleman and Garlick in 2005 reported that there were no opportunities for pre-service teachers to learn whole school approaches to EfS such as that promoted in NSW. Furthermore, while parts of undergraduate courses, mandatory or optional, taught about environmental concerns they were not tailored specifically to the needs of teachers, meaning that they added to environmental knowledge but not to the skills teachers require (Tilbury, Coleman & Garlick, 2005). As an example, Tilbury, Coleman and Garlick (2005) made the point that some components of teacher

education addressed particular environmental issues (eg water) and developed expertise in delivery of a specific program but the pedagogical components of EfS such as envisioning, critical thinking, values clarification, systems thinking and action were seldom included in teacher education. In a further example, Gooch et al. (2008) reported that few of the pre-service teachers in their study planned for children to undertake critical thinking and action in the environment.

It appears that since 2005, there has been some increase in provision of teacher education in the area of the environment and this could be attributable to many circumstances. As examples, in 2009, Charles Sturt University in NSW offered a pre-service primary teacher unit titled *Education for Sustainability*; Southern Cross University in NSW offered an elective unit titled *Environmental Education*, several core and elective units were offered by the Victorian Monash University including *Experiential Environmental Education* and *Sustainable Futures*, and James Cook University in Queensland offered an elective unit titled *Environmental Education for the Tropics* (Whitehouse, 2008). Positive outcomes have been attributed to programs offered by Whitehouse (2008) based on place-based environmental education (Gruenewald, 2003) and by Boylan and Collin (2006) who incorporated collaborative work with EEC staff. These programs included a substantial practical component or form of experiential learning. An increase in detailed reports of EfS offerings in teacher education in Australia would be extremely useful to those working in the field.

There has also been concerted effort to ‘mainstream’ EfS philosophy, content and activities into all policies and practices associated with initial teacher education (Ferreira, Ryan & Tilbury, 2007b; Ferreira et al., 2009). Efforts towards mainstreaming EfS in pre-service teacher education deserve particular attention because the mainstreaming model offers an alternative to the notion of a dedicated EfS unit of work. ‘Mainstreaming’ here refers to:

the incorporation of [EfS] philosophy, content and activities within an initial teacher education system to such an extent that [EfS] becomes embedded within all policies and practices. Mainstreaming change necessitates going beyond the mere addition of [EfS] into the curriculum, and implies a wide-scale reorientation of the whole initial teacher education system towards sustainability (Ferreira, Ryan & Tilbury 2007b:226).

As such the mainstreaming model is far more ambitious in its goals and broader in its scope than a single dedicated unit in EfS. Indeed educational initiatives such as EfS that are innovative in terms of being different from the education that pre-service teachers themselves would have experienced are thought only to be successful if the change messages are reinforced over a long period and through all aspects of a teacher education program (Wideen, Mayer-Smith & Moon, 1998). A mainstreaming model of pre-service teacher education in EfS may offer this advantage (Ferreira, et al., 2009).

Over a decade ago, considerable arguments were made in support of a dedicated unit of environmental education in pre-service teacher courses (Ballantyne, 1995; Oulten & Scott, 1995). It was argued that this would have the advantage of offering a holistic and in depth conceptualisation of environmental education, in a manner unlikely to occur if environmental education was infused over many units as the responsibility of many teacher educators rather than one.

Ballantyne (1995) argued that attempts to infuse environmental education throughout pre-service teacher education would be thwarted by various institutional factors and would be particularly difficult because such an approach would rely upon the presence of many individuals enthusiastic to incorporate it into their units. This very obstacle was subsequently reported by Van Petegem et al., (2005) who found that although a team of tertiary teachers agreed that everyone should address, in this case, EE in their discipline, there was lack of motivation of all as a team, lack of knowledge, and reluctance to adopt new material and to change existing practice. Similarly, in a review of pre-service environmental education in Canada, Beckford (2008) reported that constraints were the discipline-centred culture of faculties of education and a lack of awareness, commitment and interest of faculty members. The nature of these constraints suggests that attempts at interdisciplinary environmental education for pre-service teachers could be challenging.

Whilst there are arguments in support of a dedicated EfS unit in pre-service teacher education and reported practical difficulties associated with mainstreaming (Steele, 2010), there is insufficient evidence to conclude that a dedicated unit is necessarily a

better way forward. As mentioned, mainstreaming offers not only the notion of incorporating EfS into many pre-service units, but also the promise of greater strengths in undergraduate environmental education through system-wide reform.

This section has identified what has been reported as important elements of teacher education, weaknesses, and also a growing interest in teacher education in EfS in Australia. Attention is now turned to the special conditions surrounding beginning teaching, because this project investigates how teachers engage with EfS at the very early stage of their careers.

2.12 Beginning teachers: how it is in the first teaching year

There are many studies of the first teaching year (see for example Wang, Odell & Schwille, 2008). Whilst none appears to specifically refer to EfS, they collectively initiate a conversation about the possible nature of the first teaching year and of what new teachers such as the ones participating in this study might be experiencing.

Important to this study is the notion of identity, that is, ‘an ongoing and dynamic process which entails the making sense and interpretation of one’s own values and experiences’ (Flores & Day, 2005:221). A person’s identity, as teacher, is particularly influenced by his or her experience as school student; by initial teacher education and practicum; and by the context of the school in terms of its culture and leadership (Flores & Day, 2005). A collaborative school culture, for example, is associated with positive teacher identity. Experience from any one of these circumstances could contribute to an individual’s construction of environmental concern as a part of teacher identity.

Whilst for some the first teaching year is a successful and satisfying experience (Hebert & Worthy, 2000), others, particularly in the first semester, experience feelings of isolation and loss of identity (Maxwell, Harrington & Smith, 2007). The implication is that beginning teachers may enter their careers with particular hopes and intentions but these may alter with initial teaching experience.

Beginning teachers respond in different ways to their first teaching experience, but there appears to be a pattern of teacher development wherein early career teachers initially focus attention on themselves as teacher, reflecting on their personal teaching practices especially classroom management and related issues (Furlong & Maynard, 1995 cited in Frid, Redden & Reading, 1998). Later, attention is turned to student learning and then later again to reflection on broader educational issues and personal beliefs about teaching. The suggestion from this and other 'stage theories' (Bullough, 1997) is that early career teachers are preoccupied with adapting to their new profession in quite practical terms. The implication is that matters such as EfS as a critical pedagogy may be far from the forefront of their thinking. Furthermore it is not uncommon for beginning teachers to shift from an initial student-centred approach to a more teacher-centred and task-oriented one because of classroom management problems (Flores & Day, 2005). Should such a shift occur, early career teachers could find their practice incompatible with the ideals of issues-based EfS where students are actively and collaboratively investigating matters in the local community and acting on their plans for change.

A sense of positive professional identity is thought to contribute to a teacher's self-efficacy and motivation (Flores & Day, 2005) both of which can be attended to in a teacher education program (Jones, 2009). Teacher efficacy refers to the individual's confidence to perform specific tasks (Pajares, 1992). Perceived self-efficacy has been shown to influence a teacher's willingness to engage with particular teaching practices such that a person with a high sense of self-efficacy will apply more effort to attaining goals (Bandura, 1997). Self-efficacy is a perception of teaching competence and is thought to be influenced by success in performance, vicarious experience or observation of another's performance, verbal persuasion from others (positive and negative) and emotional arousal associated with the experience (Bandura, 1997). It would seem that ideally teacher education in EfS should include opportunities for pre-service students to experience success in EfS teaching themselves and to experience others working in EfS in a positive way.

Where a positive sense of teacher efficacy has developed, it is connected to specific tasks, subjects and contexts of teaching rather than applying to teaching in general

(Tschannen-Moran & Hoy, 2001). This can leave an otherwise confident teacher feeling less able to accomplish goals in particular areas. As an example, primary teachers often lack confidence in teaching science, seeing themselves as ‘non science’ people and having poor attitudes and beliefs about science and their capacity to teach science (Howitt, 2007). This is one reason why some primary teachers avoid teaching science. Science and a scientific way of thinking are a part of EfS. The suggestion in this example is that the scientific basis of environmental issues should be a part of pre-service teacher education for the purpose of building confidence in ability to effectively handle this aspect of the work, and this point has been made above.

Teaching has been described as an emotional practice, one in which teachers begin curriculum planning with intuitive understandings about what is likely to engage their students and ‘with their own passions and enthusiasms about ideas, topics, materials and methods that they could picture working with their classes’ (Hargreaves, 1998:849). The suggestion is that teachers’ particular interests influence their teaching choices. The suggestion is also that teachers can find the planning processes engaging, and that over-prescription of teacher activity can be counterproductive in terms of teachers’ engagement with their work. Where a school’s supervisory policy includes detailed prescription of lessons, beginning teachers could become less engaged with their work.

The influence of school culture and the beginning teacher’s supervisor are substantial. Without appropriate encouragement and guidance and where the norms and values of the school are inconsistent with those of the beginning teacher, initial enthusiasm can be replaced with compliance (Flores & Day, 2005). This could well be the case for individuals interested in EfS given that implementation of EfS in schools is reportedly spasmodic (Tilbury, Coleman & Garlick, 2005). An explanation of how the existing culture of the school can influence beginning teachers is as follows:

Clearly, teachers in their first full-time appointment have not established specific work patterns and are still developing conceptions about what is required and expected of them as teachers. They are therefore, very susceptible to influences of more senior colleagues. A particular benefit of beginning teachers coming into ... [collaborative] faculties was that they were seen to readily adopt, as their own, the faculty culture and work practices of their colleagues as the norm (Panizzon, Barnes & Pegg, 2007:39).

Positive working relationships and practical assistance in this example were influential in shaping the practices of beginning teachers. If beginning teachers enter a school that supports them in this way and where the school is also characterised by strong EfS traditions, then beginning teachers may be encouraged to incorporate EfS into their repertoires of practice early in their careers.

However, as explained, support for EfS may not be forthcoming. Potentially the teaching philosophy, values prioritisation and attendant management style of the principal have a fundamental influence on EfS in the school (Littledyke, 1997; Whitehouse, 2001; Dinham & Bhindi, 2005). Whilst there are known to be principals who provide strong leadership in EfS (Whitehouse, 2001) others may not be sympathetic to it. Support may come from students whose positive response to EfS has been identified by teachers as encouraging them to continue (Kennelly, Taylor & Jenkins, 2008). In contrast, the unmotivated response of many (secondary) pupils and lack of status of EfS in schools (McConnell, 2001:38), and community opposition as reported by Whitehouse (2001) can be disheartening. Additionally, it has been shown that the cultural norms of self expression and everyday language use can inhibit teacher expression of their enthusiasm for the environment (Barrett, 2007). These examples show that there can be local rejection of environmental values by those present in the school community and this could be a deterrent to teachers who wish to engage with EfS.

From the above discussion it can be surmised that the extent to which beginning teachers might specifically include EfS in their work will have strong connections with how enthusiastic they feel about doing so, how confident they feel to do so and how knowledgeable they are. In turn their confidence or self efficacy in relation to EfS may be influenced by previous personal successes and other experiences of EfS as well as knowledge of the issues and of the pedagogy of EfS. Similarly the work context is critical and the degree of encouragement received and the policy environment within the school will also affect willingness to include EfS.

2.13 Summary

Although contentious, a definition of EfS (Tilbury, 1995) has been chosen for this study as a basis upon which to discuss both theories and practices in EfS. The intersection of ideas from several quarters has been described so that EfS action in schools, and the decisions of beginning teachers could be understood. EfS as defined finds accord with socially critical theory and finds expression within various educational frameworks including whole school approaches to EfS, adoption of integrated curriculum and the action competence model of learning. These ideas guide ways in which EfS can be implemented at tertiary and school levels. However, other influences profoundly impact on the EfS activity of schools. These include the institutional and policy context within which EfS is placed. The literature suggests that an underlying socially critical approach to EfS could be counter to contemporary goals of schooling and this has implications for teachers who hold responsibility for implementation of environmental education policies. Ultimately this study examines the EfS understandings and actions of pre-service and beginning teachers. The literature pertaining to pre-service education and beginning teaching suggests that the personal skills and dispositions of teachers are fundamental to their efforts in any particular teaching area, and are substantially influenced by the work context.

Although there is agreement that educational effort towards sustainability is urgently required, and that simply informing people about environmental problems does not resolve them, there are no undisputed approaches or most efficacious ways forward. Moreover there is insufficient investigatory research to inform the many decisions that educators must make. This chapter has reported on efforts to put EfS on the agenda of schools, particularly in NSW, where participants in this study are teaching. Although there are reports of outstanding classroom level and school level efforts, the breadth of uptake and quality of EfS, and the impact of this work in schools remain largely unknown. It is certain, however, that if EfS is to become part of the repertoire of practice of the many rather than the few, it will have to be embedded in teacher education particularly pre-service teacher education. Reports of EfS within teacher education are limited, and there is a clear need for more information about how it could best be fashioned.

Although EfS is now a growing part of pre-service teacher education, not all new teacher graduates will have had opportunity to develop the skills, confidence and desire to engage with EfS. This research will contribute to primary teacher preparation in EfS by pursuing the question: *How can pre-service teacher education better prepare beginning teachers in EfS?* The following chapter describes and justifies the methodological approach used to investigate this question.

Chapter 3: Methodology

3.1 Context of the study and position of the researcher

This work began with preparation of a one semester, compulsory, pre-service teacher education unit titled *Education for Sustainability for the K-6 Curriculum* (commonly referred to as EDSE 412 and described in Chapter 4). This was implemented with internal enrolment pre-service teachers at a regional NSW university. The cohort of 107 completed the unit of study in the first semester of their final university year and this was followed by a ten week internship in schools. The research commenced as the final year students entered, then engaged with EDSE 412. At the points of entry and exit from EDSE 412, pre-service teachers were surveyed with the purpose of discovering their views related to EfS. In a longitudinal design, the inquiry resumed one year later. This means that participants who engaged in the latter part of the study had completed more than one semester as full time primary teachers and at this point the investigation was shaped as a series of case studies aiming to investigate the environment related teaching of participants .

The overall purpose of the research is to respond to the question: *How can pre-service teacher education better prepare beginning teachers in Education for Sustainability?* This question gives rise to two specific sub-questions. Relevant to the first phase of the study is the question: *How does a teaching unit in EfS impact on pre-service teachers?* Relevant to the second phase is the question: *In what ways do beginning teachers engage with EfS and why?*

My role, in addition to being sole researcher, should be declared (Creswell, 2003; Gall, Gall & Borg, 2007). In particular, along with my university colleagues, I prepared and implemented EDSE 412. Concurrent with this research project, I worked with pre-service teachers, teachers, students and others in NSW schools in EfS on unrelated projects. I believe that education has a crucial role in transforming societies towards sustainability.

3.2 Methodology

The following explication of the assumptions of the study shows that it falls within the interpretivist paradigm and the reasons for this assertion are set out below. Creswell (1998) identifies five philosophical assumptions and these relate to ontology, epistemology, axiology, rhetoric and methodology. Each of these will be explored within the context of the research situation.

The ontological assumption of this research is that reality is constructed. Thus it is the perception of reality of the undergraduate, then early career teacher, which is sought. It is assumed that individuals will have their own conception and their own attitudes towards EfS which influence their practices and that all of these will change over time. These conceptions and attitudes are a subject of this research.

The epistemological assumption is that acquisition of knowledge of the study participants' understanding and attitudes requires the researcher to gain personal experience of participant thinking. This has profound implications for the way that information is gathered, the relationship between researcher and researched and the credibility, transferability, dependability and confirmability of research (Creswell, 1998). In particular it implies that the researcher will need to collaborate with participants and spend time in their work situation.

Axiologically the assumption is made that the research is value laden. Values and attitudes of participants are a subject of the research. Values of the researcher will influence decisions throughout the research process and therefore are declared. As argued by Hart (1996), the methodology reflects a view that practitioner-based experiential knowledge (in this case of the pre-service and early career teacher) is important in answering a research question about the usefulness of a pre-service teacher education unit for teaching practice.

The rhetorical assumption of interpretivist research is that work will be reported in a literary manner. Definitions have been discussed at length, but the very notions at the heart of this study, EE, ESD, and EfS are disputed in the academic literature. How these notions are to be interpreted by the researcher and the researched is very much a

part of the evolving understanding that is being investigated. There will be some limited departure from a purely literary reporting mode in association with particular tools selected for gathering of information. This selection of tools and associated data presentation however does not represent a departure from an essentially interpretivist methodology as will be explained in a later section.

Finally, the methodological assumption is that the researcher will work from the situation being examined in an inductive manner; work within the real world context of the participants, and be mindful of that context, because context has profound influence upon participants. The study design has to some extent emerged as understanding of the research unfolded.

On the basis of coherence with these fundamental assumptions the methodology is described as interpretivist. An objectivist conception of reality is inappropriate in this study because in an ontological sense the study is an investigation into participants' subjective world. Epistemologically the information gained cannot be assumed to be objective and axiologically the inquiry cannot be value free. Therefore on the basis of the fundamental assumptions made in this instance, a positivist approach is inappropriate. However, some quantitative data in the form of participant ranked perceptions have been collected. These have been reported using descriptive statistics and in a manner consistent with the interpretivist paradigm as described below. Furthermore, whilst this work is interpretivist in the investigation and the assumptions above hold, it is critical in its reporting in a manner following Stevenson (2004).

3.3 An interpretivist approach: advantages

Interpretivist studies are normally qualitative. Qualitative research methods are particularly useful in interpreting social phenomena from the perspective of the respondent (Le Compte & Goetz, 1982; Miles & Huberman, 1994). This study has conformed to this key aim of interpretation by seeking to understand the position of the research participants in relation to EfS during the pre-service phase and as their role changed to early career teacher. The following discussion examines several key characteristics of qualitative research that make it the most appropriate means of answering the research question.

Capturing the 'everyday'

An important and defining feature of qualitative research is its focus on capturing and understanding ordinary or 'daily' events, occurring in natural settings (Maykut & Morehouse, 1994; Miles & Huberman, 1994). This feature makes qualitative methods appropriate for this study because the influence of the 'everyday' on participants is of interest.

The importance of context

It follows, that in attempting to capture 'normal' daily life, qualitative research involves a concerted effort by the researcher to gain an holistic view of the research context. Such research has the potential to reveal complexity, and assist in understanding processes, and even causality (Miles & Huberman, 1994). The realisation that formal teacher preparation is just one influence on teacher decision making prompted inquiry wherever possible, into aspects of each school's physical and social milieu as well as something of the interviewee's personal history. Finally, the need to address the unique context experienced by individual participants influenced the design of interview and survey tools.

Research flexibility

Creswell (1998) also notes that flexibility is a feature of qualitative research. While quantitative studies generally involve a predetermined and controlled research design, qualitative research may be influenced by research participants and the information they provide. This flexibility enables the researcher to better capture dynamic social processes and events (Miles & Huberman, 1994). Design flexibility was particularly useful in the current study, allowing for example, the prepared interview schedule to be adjusted during interview to accommodate the peculiar situation afforded by each early career teacher and his or her school.

3.4 An interpretivist approach: realities and design implications

A premise of interpretivist research is that the researcher can gain an understanding of how another individual perceives the world. However, a key limitation is that one person can never fully enter the consciousness of another, and furthermore, the

researcher enters the field with preconceived ideas. This results in bias of what is perceived and how it is interpreted. Steps therefore need to be taken in qualitative research to ensure that it is valid in its procedures, conclusions and claims for applicability. Reid and Gough (2000) note that consideration of the following criteria: credibility, transferability, dependability and confirmability, is appropriate for evaluating qualitative research. Each of these has been considered in the design of this project and will be discussed later under *3.22 Validity of procedures, conclusions and claims for applicability* (see page 73).

3.5 Research design

The original design of the research and ongoing monitoring of progress was assisted by use of a planning matrix as suggested by Smyth and Maxwell (2008). Phase one was focused on a pre-service teacher education unit in EfS and how the participating cohort of students engaged with it. Data collection occurred at three times: T1 was the commencement of EDSE 412; T2 was the final session of EDSE 412. T3 was during the middle week of the following ten week internship and was an opportunity for initial pilot of subsequent research methods.

During phase two the focus of the study was on five graduates of EDSE 412, after a minimum of almost three school terms of full time teaching. This longitudinal design facilitated explanations of how particular experiences in phase one influenced events in a later time period. In phase two (T4), the focus of inquiry shifted from the pre-service teacher and his or her interpretation of EDSE 412 to the early career teacher working within and influenced by a dynamic school situation. Case study provided a means by which that school situation could be described and understood from a variety of perspectives. At this point multiple data sources were used to gather information about the EfS work in the participant's school. Additionally second phase information was compared with first phase information for the same participant. Cases were then compared in a cross case analysis. It is important to note that reporting of the phase one analysis relating to the five case participants occurs in the individual (second phase) case reports. This is because the entire data set (phases one and two) relating to the five case participants is used to answer the question *In what ways do beginning teachers engage with EfS and why?* and this question is the subject

of the chapters dedicated to individual case reports. This design was informed by Bazeley (2007) who argued that reporting should follow the research question rather than chronological considerations.

3.6 Strategies of inquiry: using mixed methods

This study adopted a mixed methods strategy of inquiry, using mainly qualitative methods but with a small component of quantitative data. This is because use of some quantitative data sources within an overall interpretivist study provided the best way to answer the research questions (Teddlie & Tashakkori, 2003). Furthermore, use of some quantitative processes offered the potential for triangulation of data sources (Creswell, 2003). The following sections provide information about data gathering methods including instruments used and sample selection in both phases of the study.

3.7 Phase one methods

Instruments employed in phase one were survey and interview and observations were recorded in a tutor/researcher's diary during the semester length of EDSE 412. Survey A was administered at the commencement of EDSE 412 (T1) and a parallel Survey B at the end (T2). Phase one interviews were held at the end of EDSE 412 (T2).

3.8 Surveys: justification

Survey may seem to introduce an apparent inconsistency in choice of methods in an essentially interpretivist study. However the use of a quantitative tool was at the level of data gathering, not at level of paradigm or overarching world view (Sandelowski, (2003). This is because the survey used comprised open questions and rankings of participant views and so in this sense the underlying assumption of socially constructed reality was not challenged.

Survey was selected because it was considered that quantitative survey data added breadth to interview data and allowed the possibility of different viewpoints to arise from a larger sample. In particular, in a design where a small number of interview participants was drawn from a wide survey sample, the survey provided information about how representative or otherwise the interview sample was with respect to

particular surveyed attributes. Additionally, the survey facilitated triangulation of data sources as described by Bryman (1988) thus enhancing the validity of interpretation.

Ultimately, surveys A and B were minor instruments in this project but served a number of purposes. They contributed to an answer to the first question (*How does a teaching unit in EfS impact on pre-service teachers?*) by providing information about the participants' motivation, confidence and capacity to act for the environment through teaching. The overall purpose of surveys A and B was to provide:

- some response to EDSE 412 prior to and at the end of the unit;
- information contributing to understanding of the phase two case study participants including how typical they were in relation to the cohort along particular dimensions; and
- triangulation of data by comparison with interview responses.

3.9 Development and administration of phase one surveys

Class time was provided for completion of surveys in the first and last sessions of EDSE 412, however neither completion nor submission was compulsory. Pre-service teachers were given the option of identifying themselves on the survey form. As surveys were completed they were deposited by participants at a central point in the classroom. This procedure was adopted so that no individual felt pressured to provide his or her identity and was intended to encourage honesty of response.

Survey A and Survey B (Appendix 3.1) are identical with the exception of additional questions in Survey B (items 9 and 10), which allowed reflection on EDSE 412. In line with the first research question one as printed above, the survey questions are about participant confidence, motivation and perceived capacity to include EFS in their teaching, as well as beliefs regarding the environment. Accordingly survey questions 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10 investigate this topic. Question 5 was adapted from a survey reported in Yencken, Fien and Sykes (2000) and questions 6, 7 and 8 were adapted from a survey by Walker, Loughland and Brady (2000). These questions were intended to illuminate the degree of, and explanations for participants' desire to engage with EfS, and their perceived capacity to do so.

A pilot survey to determine face validity was conducted with three students who were enrolled in EDSE 412 but because of anomalies in their enrolment could not be a part of the longitudinal study. Alterations were made in discussion with pilot participants and from discussion with project supervisors. A copy of the survey instruments can be found in Appendix 3.1 A and Appendix 3.1 B.

3.10 Sample selection for phase one surveys

This was a cohort study in the sense described by Cohen, Manion and Morrison (2001) where the cohort was a group of people with the common characteristic of completing EDSE 412. The majority of participants were female (N = 88). Their age range was 20 to 25. The views of every pre-service teacher were considered important and therefore the entire enrolment of 107 was invited to participate. The response rate was high with 104 completed surveys being used in the analysis.

Problems of sample selection for the survey as described by Lin (1976) did not arise because the entire cohort of final year students voluntarily participated in surveys A and B. However there could have been problems arising from the interaction between the instrument, the respondent and the researcher. Lin (1976) suggested that such interactions generally induce the respondents to respond towards neutrality or towards perceived ideals. The main design elements used to address this problem were voluntary identification by individuals (meaning students were offered the opportunity to not identify themselves on the survey) and triangulation by data source for those individuals who were interviewed for the purposes of the phase two investigation.

3.11 Analysis and reporting of survey data: detailed procedures

Frequency of responses to questions 1, 3, 5, 6, 7 and 8 were calculated and percentages derived. Comparisons were then made in order to provide an overall picture of participant response and change in response over EDSE 412. Purely descriptive statistics were deemed adequate and indeed it could be argued that more inferential data analysis. Answers to the free response items 2, 4, 9 and 10 were typed and then analysed through a process of coding and tabulating (Hardyck & Petrinovich, 1975) similar to the coding of qualitative interview data described below. Coded responses were examined to determine the nature of any qualitative shift in the pre-

service teachers' views in relation to EfS over the course of the teaching unit, meaning whether participants had provided reasons for any identified change or lack of change.

The comparison over time (T1 to T2) was reported at two levels: at a cohort level; and at an individual level for selected participants. The outcome of the latter comparison is included in the case study reports, whilst other findings from phase one are reported in Chapter 5.

3.12 Interviews: justification

Purposes of the phase one interviews were threefold. Firstly investigation at this time could establish the views of participants regarding EfS and how participants believed those views had been shaped. Secondly it was believed that pre-service teachers at the completion of EDSE 412 could provide valuable feedback in terms of what they considered to be worthwhile in the unit and why. Finally information from the phase one interviews could be used in a process of triangulation to substantiate or otherwise information from other data sources.

Interview was chosen as a primary means of collecting data. The reasons for this selection are well summed up by Kvale (1996:105) who commented that:

it should not be forgotten that interviews are particularly suited for studying people's understandings of the meanings in their lived world, describing their experiences and self-understanding, and clarifying and elaborating their own perspective.

The participant's own experience and self understandings are central to this research and therefore interview was selected.

In the interests of answering the research questions a semi-structured interview format was chosen for all interviews in this study. This is one where:

[an] interview ... schedule is developed around a list of topics without fixed wording or fixed ordering of questions. The content of the interview is focused on the issues that are central to the research question, but the type of questioning and discussion allow for greater flexibility than does the survey-style interview...this may reduce the comparability of interviews within the study but provides a more valid explication of the informant's perception of reality (Minichiello et al., 1999:65).

The semi-structured interview is similar to an unstructured interview in the sense that the mode of asking questions allows an in-depth examination of the participant's view, but is dissimilar in that a schedule is provided as a guide, allowing easier comparison between interviews. A semi-structured interview has the advantage of flexibility over the structured interview wherein an interview guide is prepared and questions are asked in a set order. Furthermore the structured interview format is based on the assumption that the researcher knows the sort of information he or she is looking for in advance and this was not entirely the case.

In making that selection, the following kind of in-depth interview was sought:

interviewing is a conversation with a specific purpose – a conversation between researcher and informant focusing on the informant's perception of self, life and experience, and expressed in his or her own words. It is a means by which the researcher can gain access to, and subsequently understand, the private interpretations of social reality that individuals hold (Minichiello, et al., 1999:61).

The purpose of the phase one interviews (T2) was primarily to establish the views of pre-service teachers regarding EFS prior to their experience as independent teacher professionals. The purpose of the pilot interviews with interns (T3) was to assist in preparations for phase two.

3.13 Development and administration of phase one interview

Questions prepared for the interview schedule were directed by the research questions but were also devised on the basis of researcher teaching experience and upon a reading of EfS literature.

As recommended by Kvale (1996), the initial questions were trialled with one of the cohort. This individual was known to be unavailable for phase two of the study and was therefore a suitable candidate. The pilot interview was undertaken in order to determine if all of the questions were clearly expressed; which questions gave the interviewee the best opportunity to express views; which did the interviewee regard as the important issues; and which questions seemed irrelevant. The pre-service teacher invited to assist in the pilot answered each question and then discussed ways in which the guide could be improved. After this lengthy pilot, the schedule was reviewed and amended (Appendix 3.2).

With permission, all interviews were audio-taped. Interviews were conducted at a time and place convenient to the interviewee and were organised so that the potential for interruption was minimised. Interviews lasted for 30 to 60 minutes.

3.14 Sample selection for phase one interviews

Volunteers for Interview A were sought from amongst the entire cohort by means of announcements made in class. Thirty-eight phase one interviews were conducted towards the end of EDSE 412 whilst the participants were still completing the unit. The second group of interviews was conducted 10 to 12 weeks later with five interns who were a sub-set of the 38 participants from the first interview round. The interns volunteered their involvement in response to email correspondence. The selection of five case participants from the set of 38 is described and justified below in the phase two section (see page 70). This was essentially because the selected five became the phase two case participants and because the findings associated with these phase one interviews are reported within the phase two cases.

3.15 Analysis and reporting of interview data: detailed procedures

All interviews from phase one and relevant to phase two were fully transcribed by the researcher and the transcripts reread several times. The entire transcripts were coded into descriptive codes using NVivo software (Bazeley, 2007). Reported segments of interview transcripts have been edited slightly to improve readability. However, great care has been taken to not alter the meaning of what was said.

Many of the descriptive codes were derived directly from the questions asked in the interview schedule and these were directly linked to the research question. Other codes arose from interpretation of the data. Reflective ideas were recorded in memos as they arose. Questions to be asked of the data were decided upon in line with the research question. To answer these questions the NVivo query function was used extensively and quotes transferred from the coded transcripts into separate documents according to questions asked. A preliminary analysis of the quotations was then written in response to the questions asked of the data. Quotations were retained in full to allow subsequent checking of interpretation. This process was repeated as more

questions arose during the analysis. In this way the final choice was influenced by the reflective analysis of the researcher, as patterns were sought that provided not only description but also explanation of the observed phenomena. As explained (see page 58), findings from the phase one interviews relevant to the case studies are reported as vignettes within the phase two case studies. Findings from the phase one interviews not a part of the case study reports are used in Chapter 5 in the phase one report.

3.16 Researcher's diary

Observations were recorded by the tutor/researcher throughout EDSE 412. These were observations of how various tasks were received by pre-service teachers, about identified omissions and ideas for improvements to the teaching. The diary notes were reviewed for the purposes of triangulation of data sources in the phase one report.

3.17 Phase two overview

Information gathered during phase two informed the second question:

In what ways do beginning teachers engage with EfS and why?

Accordingly, five case studies were conducted.

3.18 Case study: justification

This second question is predicated by the basic assumption that teaching is a practice embedded in a complex situation, a view shared by Hart (1996: 64):

In introducing environmental education activities within their classrooms, teachers are engaging in practices which are related to their own understanding, that is, their own personal practical theories or that amalgam of knowledge, beliefs and assumptions in terms of which they understand and make sense of their educational practice. This epistemological view sees pedagogical knowledge as an interplay of those personal practical theories on the one hand and the complex of social, cultural and educational context within which the individual lives on the other.

That complex context is important to the beginning teacher's affective response and decision-making, and is central to the choice of case study. An understanding of what the beginning teachers did in EfS, their reasons for how they went about it, and how these might link to pre-service teacher education required a broader understanding of the real working situation of the beginning teacher. A shortfall into research on how novice teachers frame environmental education (Nikel, 2007) and into the

environmental education processes operating in specific educational settings (Kyburz-Graber, 2004) has been identified and both are the subject of this inquiry.

Case study, conceived as empirical enquiry into contemporary, real-life phenomena, entangled in a broader context (Yin, 2003) is justified, because it provides the opportunity to gain the required understanding through building on the multiple perspectives of others in the school. The underlying reasoning is that understanding of how to better prepare teachers for a teaching situation, requires understanding of the teaching situation itself. In other words if some of the challenges early career teachers will encounter in relation to EfS are anticipated via research, then it may be possible to better prepare them to meet those challenges.

For this research the type of case study described by Stake (2005) as ‘instrumental’ has been used. An instrumental case study is one where ‘a particular case is examined mainly to provide insight into an issue ... it plays a supportive role and facilitates our understanding of something else’ (Stake, 2005:445). The ‘something else’, which should be understood, is how to better prepare beginning teachers for engaging with EfS, *in the school situation*. As an instrumental case study this one is distinguished from an intrinsic case study which has the purpose of providing a better understanding of a particular case *for its own sake*.

Whilst one case would be instrumental in providing insight into the issues of EfS and the early career teacher, investigation of several cases could be expected to provide a broader understanding. Stake (2005) uses the term ‘multiple case study’ for this situation where interest is not necessarily on one particular case (one early career teacher in a school) but on multiple cases, in order to improve understanding of the position of the early career teacher in a school in relation to EfS, thereby improving the trustworthiness of the outcomes (Stake, 2005). For the present investigation, multiple case studies would, at the very least, alert the researcher of improved ways to guide pre-service teacher education in EfS and this design is therefore appropriate to answering the research question. For these reasons, and given the available resources, five independent case studies were conducted.

3.19 Design and administration of the case studies

Stake suggests that multiple case design allows better understanding about a still larger collection of cases. In line with recommendations by Miles and Huberman (1987) for expedient deployment and cross case analysis, a semi-structured interview format and same structured reporting format were adopted. This degree of structure was deemed appropriate by Miles and Huberman (1987) where the research questions are well defined, the researcher has an understanding of the setting and a conceptual grasp of the phenomena of interest. On the basis of the teaching experience of the researcher, these circumstances were deemed to apply.

A pilot case study was undertaken for the purpose of developing researcher skills in selecting data sources; prioritising sources most useful to the case; refining instruments; approaching participants; recording; and analysing and summarising data. This opportunity proved to be of great value in the refinement of case design.

By definition a case study is one bounded temporally, geographically and socially (Stake, 2005) and decisions have been made about the boundaries of the case. In this research the timing of the case studies had to be carefully considered. Beginning teachers could encounter difficulties associated with classroom management as they crossed the line from student to new professional (Maxwell, Harrington & Smith, 2007). Additionally the commencement of phase two could not be delayed indefinitely because of the time constraints of the project. A decision was therefore made to bound phase two data collection into the second school semester of the beginning teacher year and because of necessity, early into the following year. The case studies occurred at distances up to 600k from the researcher's home thus each case study reported on a single three to five day visit. The specific timing of each visit was negotiated with the beginning teachers and determined by convenience for them and their schools.

In a geographical sense each case study is bounded by the physical dimensions of the school and other locations that the participant teacher and class may visit. The particular location of each case school was determined solely by the availability of willing participant teachers.

The social boundary of each case, meaning the specific sphere of substantial social influence, is much more difficult to define. Each participant teacher had full knowledge of the purpose of the case study research and of his or her own situation. Commonsense determined that in order to locate the best information sources for answering the research questions, the participant teacher should be consulted and a boundary thereby set through consultation. On the basis of discussion with the beginning teacher, and in consultation with the principal of the school, a decision was made about whom and about what should be part of the case study. In this way participants were asked to make a contribution to the case study design. None-the-less decisions about who should be involved had to be 'bounded' in some way. The ultimate criterion for inclusion was that the information source should relate to EfS and environmental activity in the school in so far as it was linked to the work of the beginning teacher.

Data sources were therefore selected, as Stake (2005) recommended, on the basis of how well they would provide opportunity to learn about the EfS activity and views of the beginning teacher; their potential to provide insight from several different perspectives; and their accessibility. Sample selection of participants for the case is described below for each data source. Description of each data source and associated methods of analysis are described. All interviews were fully transcribed and entered into NVivo software, then analysed as described for Interview A above.

Interview with the beginning teacher

Questions were devised on the basis of researcher teaching experience, upon a reading of EfS literature and upon reflection on the pilot interviews, but in particular they were constructed to specifically address the research question: *In what ways do beginning teachers engage with EfS and why?* A copy of the interview schedule is included as Appendix 3.3.

Unstructured discussions with the beginning teacher

Spontaneous discussion that occurred during the period of the case study was recorded where possible with a digital audio recorder. Otherwise, notes were made

during and immediately after the discussion. Information from informal discussion was used in reflection on interview information and to guide further investigation in the case.

Survey C

Survey B from phase one was repeated with the beginning teacher and named Survey C. Survey C was analysed in the same manner as Surveys A and B. Survey C served to stimulate participants' reflection upon possible change in their views over time and also served the purpose of triangulation with other data sources used in the case study.

Observation

Observations were made by the researcher in the natural surroundings of the school. Physical characteristics were recorded with digital photographs and description, and were used as specific points of reference during interviews and discussions. The recorded observations contributed to the description of case context of each school. As well as informal observation of children's playground activity and everyday teacher activity outside the classroom, there were observations in the beginning teacher's classroom. For the former, reflective notes were made later in the day. For the latter detailed notes were made immediately, as suggested by Best and Kahn (2006) using a pro-forma (Appendix 3.3) prepared during the pilot phase, and with the observer sitting in a corner of the classroom or opportunistically moving about during normal class activities. Duration of the observation period was negotiated with the beginning teacher. Recording of EfS related work was dependent upon occasions when environment related activity occurred with the class. Observation was for approximately 1 hour on each of three days.

Observation produces just that, a descriptive record of that which is observed. It provides information about what people do, not what they think (Sommer & Sommer, 1980) or say. It is useful because it has the potential to substantiate intent (Minichiello, et al., 1999). Observation data are therefore complementary to interview and discussion data. The record of what happened in classroom interaction was read alongside the written class program and the teacher's report on activity for the time of observation. In this way observation data provided a deeper understanding

of the teaching situation and of the beginning teacher's understanding and expression of EfS.

Interview with school principal

School principals were interviewed in order to ascertain their interpretation of their own role and that of the early career teacher in relation to EfS in the school. For this purpose a schedule of questions was prepared in advance on the basis of researcher teaching experience, of the pilot interview of a principal and with the research question in mind (Appendix 3.3), but this schedule, as for all others, was used as a guide rather than a format to be closely adhered to. The principals were invited to have their School Management Plan (SMP) or School Environment Management Plan (SEMP) available at the time because these documents would contain reference to environmental programs in the school.

Interviews with significant others as identified by the beginning teacher and the principal

Significant others included other teaching staff as well as ancillary staff in the school and visiting community members. The interview schedule is presented in Appendix 3.3.

Significant documentation

In particular significant documentation included the school annual report, the beginning teacher's program, and displays representing events and samples of children's work. It also included school newsletters, and the SEMP. Official school documents such as the SEMP, SMP and school newsletters were searched for content (Sommer & Sommer, 1980), specifically for reports of environmental happenings, and for statements that reflected the culture of the school. These were compared with interview statements. Children's work samples were examined for evidence of EfS-related work.

3.20 Sample selection for phase two case study

For practical reasons the number of cases studied could only be small. Consequently sample cases had to be selected. Stake (2005:451) argued that the researcher should

select a sample purposively where there is ‘some typicality but leaning towards those cases that seem to offer opportunity to learn’. Whilst this was the principle upon which selection was based, there were overriding practical concerns.

A feature of the research design was comparison of participant views between phases one and two. Whilst in phase one the entire cohort of students was invited to interview at the end of the teaching intervention, 38 offered to participate, and contribute their views to phase one data. These 38 participants then became the potential pool from which the phase two cases could be drawn. The number interviewed in phase one was intentionally large because it was expected that only a small number of the 38 would fit the criteria for phase two data collection. The net had to be cast wide.

In the event the choice of cases was limited by attrition of potential subjects through loss of contact, new graduate unemployment, employment in very distant locations, and so on. A letter was sent to all potential participants six months after the completion of EDSE 412 at the university. By this time some of the potential participants had secured casual employment during the previous 10 weeks but many remained largely unemployed. The letter reminded the beginning teachers of the research program, invited them to maintain contact with the researcher and to reply with information about whether and where they had employment for the following year.

A letter from the researcher early in the school year requested further employment details and invited the beginning teachers to engage with phase two. It was important to have discussions at this point with the potential participants because their class commitments for the year would influence when the case studies could take place.

In early discussion with the beginning teacher the researcher described the project in detail. The beginning teacher was regarded as a partner in the research and therefore his or her ideas with regard to planning and timing were important. Shortly prior to case visits letters were sent to principals describing the project and inviting them to participate. Approximate timing was in this way negotiated early in the school year

with the beginning teacher and principal, with details to be finalised during the second school term.

Attrition was high and just six candidates suitable for the research were available. Two were male and all were aged between 20 and 25. All agreed to participate and one was selected, on the basis of physical proximity, to participate in a pilot study.

3.21 Drawing the parts together: Analysis and reporting for each case

Recording and analysis of each data source are described above. The immediate goal was a deep understanding of each case (Bazeley, 2007). Questions to be asked of the data were derived from the research questions, researcher experience and the relevant literature. The NVivo query function was then used to run questions across the coded data sources. Query results, and other information such as observations, were reviewed to provide detailed description of each case and contributions towards explanations of what Stake (2005) described as the interactivity of the case. This analysis, along with a rich description of the study site, contributed to a case report which was intended to afford transfer of findings by analogy on the part of the reader. This is distinct from the researcher making generalisations to other settings (Stevenson, 2004) as discussed below (see page 73).

Contributing to the decision making of the individual case participant were his or her past experiences including experience of pre-service teacher education. Each case participant's phase one aspirations and interpretations relevant to teaching and to EfS are reported in a vignette, as described by Miles and Huberman (1994), within each case report. The vignette serves to provide a basis upon which explanations could be proposed regarding the connections between the outlook of an individual as pre-service teacher and later as beginning teacher. In this way the case participant's earlier experiences, part of which include EDSE 412, became a rich part of the case, and highly relevant to answering the case study question '*In what ways do beginning teachers engage with EfS and why?*'.

Each case is reported independently as suggested by Stake (2005:458) to afford the reader the opportunity to 'learn more about it directly from the description'. Of

necessity the case reports have been substantially reduced in length. None-the-less each is intended to be sufficiently detailed for readers to draw their own conclusions as suggested by van Maanen (1999). Case reports are presented in Chapters 6, 7, 8, 9 and 10.

Because there are multiple case studies, each case has been compared with the others. Analysis across the cases began with a series of summary tables or matrices, examples of which are retained in Appendices 11.1 and 11.2. Common sub-headings have been used in all five case reports. This arrangement facilitated comparison. Also facilitating the cross case analysis was the organisation of original interview transcripts into the questions from the schedules. This allowed searches as heading queries in NVivo. Queries for individual codes were also run across all five cases.

Comparing and contrasting of the cases enriched understanding of the beginning teachers' perceptions and needs in relation to EFS. The comparison was intended to help identify what was common across cases and what was unique. Cross case analysis addresses the possibility that any one case is idiosyncratic and therefore this procedure was intended to add to trustworthiness and generalisability of the analysis as suggested by Miles and Huberman (1994). The findings of this analysis are reported in Chapter 11.

3.22 Validity of procedures, conclusions and claims for applicability

With reference to both phases of the project design, attention has been given to credibility, transferability, dependability and confirmability of the study as recommended by Reid and Gough (2000). The quality of data collection, analysis procedures and conclusions drawn was built into both phases through application of design elements described below.

Credible research provides an authentic representation of the subjects' experience. Attention to credibility has been necessary in a situation where the researcher is the 'instrument' of data collection and it is assumed that there are multiple realities. In both phases of this study, credibility has been improved with:

- purposive sampling;

- declaration of researcher subjectivity;
- prolonged engagement of the researcher; and
- triangulation of different data types and methods (qualitative and quantitative) as suggested by Miles and Huberman (1994). In phase one there was triangulation within the survey through use of open questions which allowed participants to explain ranking choices, as well as triangulation of survey data and researcher diary notes. There was triangulation of phase one interview and survey information for those individuals participating in phase two. In phase two there was triangulation by data source: interview data from a range of participants within each school allowed clarification of perceptions and interpretations in the way described by Stake (2005).

Transferability of research refers to its relevance beyond the study situation. This research is bounded by its own context and its own time. Whether or not the research is transferable can only be judged by other people in their own situation. For this reason:

- sampling was purposeful;
- in phase two description of the cultural and physical context of each case was ‘thick’ to allow readers to know and understand the findings, and to understand the context well enough to be able to decide if the findings are transferable or applicable to their own situation. Stake (2005) argued that comparison obscures any case knowledge that does not readily facilitate comparison and therefore reader assessment of applicability can be compromised. It is for this reason that the integrity of individual case reports is retained; and
- views of case participants were compared with those of the entire cohort along particular parameters. This procedure was intended to reveal idiosyncrasies of the case participants in those dimensions with the intention that reader assessment of transferability would therefore be improved.

Dependable research is where idiosyncrasies of interpretation are minimised. Consistency in the interpretation of phenomena has been addressed through:

- the researcher being present in the full sense of that term;

- the researcher's role being explicitly described;
- through use of a pilot survey in phase one, pilot interviews during T3 and a pilot case study at the beginning of T4;
- through triangulation of data sources; and
- a process of second party (academic supervisor) scrutiny of qualitative data interpretation.

Confirmable research is where the influence of biases, motivations, interests and perspectives of the researcher are minimised and declared. Confirmability has been improved by:

- open reporting of researcher interests; and
- open reporting of procedures including documentation of procedures used in data analysis: collection, processing, condensing and drawing of conclusions.

3.23 Limitations of the methodology

In this study, long engagement with beginning teachers improved understanding and potentially the credibility of the study. However it is acknowledged that where this occurs, credibility can be compromised by personal involvement. Researcher interests and involvement have been minimised but also declared to allow reader assessment of credibility.

The intent of this study has been to use a longitudinal design to reflect upon the experiences of beginning teachers in order to improve pre-service teacher education in EfS. The outcomes of the study are limited by the fact that the design provides only a 'snapshot view', taken for the individuals involved at two points in time.

The phase one survey, although providing numerical data that could be reported in a descriptive manner, was primarily intended to illustrate the nature of the cohort as a whole, along particular dimensions, and to extend understanding of the qualitative data. As an example, self ranking of 'confidence' by participants, followed by opportunity to explain the ranking offered information about the nature of the individual's personal perception of confidence and, importantly for this study, what

influenced that perception. In this way explanation was being sought, through the survey, from those experiencing the process of teacher education.

The phase two cases were few in number meaning that they cannot be claimed to be more than weakly representative of a larger population and that valid generalisations cannot be made from the case to the broader population of beginning teachers. Effort has been made to place the views of the phase two participants within the context of the wider cohort. However both the phase two and phase one samples remain small. Whilst it can be argued that multiple case design, thick description and cross case analysis add to the value and trustworthiness of knowledge (Stake, 2005), the reader must determine applicability to an external situation.

Whilst recommendations can be made on the basis of the findings of this study, no predictive statements can be made (such as a statement that a particular approach in pre-service teacher EfS will bring about a particular result). Any recommendation made on the basis of the findings should be interpreted within context to determine if the recommendations are generalisable to readers' own circumstance.

3.24 Ethics

Data were collected in accordance with the guidelines, and with approval from, the University of New England Human Research Ethics Committee (Approval numbers HE07/058 and HE08/051). Acceptance from the DET Strategic Research Directorate was obtained (SERAP number 2007217). A copy of the relevant documents is provided in Appendix 3.4.

Written information describing the project and a written invitation to participate was prepared for all participants. For phase two case studies, written permission was obtained from school principals prior to commencement of work. In this way entry into schools was contingent upon the full understanding and consent of the principal as well as the willing agreement of the early career teacher. The researcher engaged in discussion with participants to ensure that interviews and observations took place at their convenience.

The anonymity of all participants and their schools has been strictly maintained. In reporting, pseudonyms have been used for all participants and for their schools.

All data has been stored according to the guidelines of the University of New England Human Research Ethics Committee with all identification first having been removed from transcripts and audio-recordings. In particular, data will be stored for five years in a locked cabinet in the researcher's home.

Specifically for this project, due regard has been taken for:

- the need for confidentiality;
- the need for anonymity of all kinds especially given the small sample size;
- the importance of not disrupting normal school business;
- the importance of not wasting the time of very busy people;
- observation of etiquette in approaching people in the school; and
- using the results wisely to make the task of implementing EfS a more informed and more widely supported process.

3.25 Summary

This chapter has discussed the theoretical background to this research, then described and justified the choice of design and methods for data gathering, analysis and reporting. It has also provided considerable detail about the sample, the researcher and particular factors that impinge on the research situation. From here the following chapter describes the university unit *Education for Sustainability for the K-6 Curriculum*.

Chapter 4: A unit on Education for Sustainability for pre-service teachers

The purpose of the present research is to find how to better prepare beginning teachers to engage with EfS. It is important to document what beginning teachers involved in this study experienced in EfS during initial teacher education, so that strengths and deficiencies, identified from the research, could be reflected upon. This chapter describes and justifies the original choices made when the opportunity to incorporate EfS into a final year pre-service teacher education unit arose. The development of the unit does, in its own way, contribute to the overall purpose.

In Chapter 2 there is a discussion of various recommendations for, and examples of, teacher preparation in EfS. These were drawn upon in the development of the unit. In particular the UNESCO *Guidelines* suggest that teacher education in ESD must be ‘locally relevant and culturally appropriate’ (UNESCO, 2005:16) and the institution must ‘model what it teaches’ (UNESCO, 2005:71). Following these and other suggestions, a deeply school-based approach was taken, grounded in the realities that prospective teachers were likely to experience in NSW schools. The objectives and content for the teaching unit are presented in Appendix 4.1 and Appendix 4.2 respectively.

In the following description of the pre-service EfS unit, titled *Education for Sustainability for the K-6 Curriculum* (often referred to as ‘EDSE 412’), a framework proposed by Gutek (1988) is used. This framework describes a philosophy of education comprising several aspects, each of which influences teaching and learning. For the higher education practitioner these aspects include: espoused educational aims of the relevant institution; curriculum content; the learning theory through which learners learn; and accepted teaching practices. Gutek’s framework is useful in so far

as it recognises teaching as a practical pursuit occurring within a context shaped by external demands, as well as by the internal beliefs of the teacher.

4.1 Educational aims of relevant institutions

The educational aims of several institutions were relevant to the development of the EfS unit of work. Institutional aims have significance because they frame the interpretation of EfS that teachers in Australian schools are urged to adopt. Of particular relevance were the educational aims of the University of New England, of the Commonwealth Government of Australia through its *National Environmental Education Statement for Australian Schools* (ADEH, 2005) (Appendix 4.3A), of the NSW Government through its *Policy on Environmental Education for Schools* (NSW DET, 2001a) (Appendix 4.3B) and syllabus outcome statements for each KLA in schools (Board of Studies NSW). *The National Statement* (ADEH, 2005) and the *NSW Policy* (NSW DET 2001a) are largely compatible in that both adopt a whole school approach to EfS, endeavouring to build capacity of students and of school communities to instigate change towards sustainability.

Prospective teachers who graduate from this university are most likely to seek employment in NSW, wherein EfS is mandatory for schools, meaning that NSW documentation is particularly relevant. The view of EfS presented by the Commonwealth Government *could* be overlooked in Australian schools because implementation of the *National Statement* (ADEH, 2005) is not mandatory. However, because of the potentially increased importance of the view of the present Commonwealth Government towards EfS, given an impending national curriculum, it was necessary to consider the Commonwealth view in teacher education in NSW.

As well as these key documents in EfS, pre-service teacher courses in NSW are particularly influenced by a statutory body, the NSW Institute of Teachers, which requires the university to comply with their Mandatory Requirements for Teacher Education Programs (NSW Institute of Teachers, 2007) and for graduates to attain the Graduate Teacher Standards (NSW Institute of Teachers, 2006b). The approval framework stipulates subject matter and pedagogy for the various Key Learning Areas but stipulates nothing explicit for EfS. This situation impacts significantly on the

provision of EfS as its inclusion rests upon its integration into subject and/or pedagogy based units of study at the discretion of the teacher education providers. The standards from the NSW Institute of Teachers relevant to EDSE 412 are incorporated in the unit objective statements in Appendix 4.1.

4.2 Learning theory

Whilst Dillon (2003) suggested that learning theory is not widely discussed in environmental education literature, Meyers (2006:466) maintained that there 'is agreement on the usefulness of constructivist learning theory in environmental education'. Meyers (2006:466) interprets constructivist theory as the provision of semi-structured learning experiences where:

learners experience the natural environment, gain direct experience with natural processes – their fragility, human need for them, human impact on them - and gain the skills needed to investigate how to take effective actions on their environmental concerns ... There appears to be near unanimity of opinion in environmental education research that providing students with significant opportunities to conduct a guided inquiry into the socio-political aspects of an environmental question ... is a key teaching methodology for facilitating environmental learning.

There appear to be few empirical studies investigating the use of constructivist inquiry into environmental questions of the kind Meyers suggests, and this is not surprising given that there is very little at all in the research literature that reports on the processes of learning in environmental education programs (Rickinson, 2006:446) with only a few being available (see for example Aleixandre & Rodriguez, 2001; Ladwig, Ross & Ellis, 2008). For the pre-service teacher unit discussed here, a constructivist approach was generally adopted and encouraged. This is demonstrated below in descriptions of strategies used.

4.3 Curriculum content

A curriculum consists of the organised experiences of students under the guidance of their tutors. Tutors must make a value judgment about which experiences and subject matter are most useful for pre-service teachers. They also determine assessment tasks. Such decisions are contingent upon the values and experience of the tutors, as well as an understanding of the primary curriculum into which EfS is intended to be infused.

Subject matter knowledge refers to the main concepts and facts within an area of study and the relationship between them (Grossman, 1990). Subject matter knowledge has been demonstrated as of key importance in teacher professional learning in EfS (Ladwig, Mockler & Ross, 2010). Teachers draw on their subject knowledge to inform teaching and learning, to readily locate resources and select content (Grossman, 1990). ‘Knowledge’ is a term often mentioned in EfS but begs the question as to exactly what ‘knowledge’ is being referred to or can be considered important.

Although specific elements of subject matter thought to be important in EfS have been remarked upon (Boyes & Stanisstree, 1993; Skamp, 1999; Stewart, 2006; Zemits, 2006; Skamp, Boyes & Stanisstree, 2009), lists of essential concepts considered (see for example Maxwell & Metcalfe, 1999/2000; NSW DET, 2001b) and the lack of suitable knowledge of teachers identified (Khalid, 2001; Cutter-Mackenzie & Smith, 2003), there remains a gap in the literature in general about what subject matter knowledge matters in EfS. This may be attributable to the fact that the subject matter of EfS is largely part of the subject matter of recognised disciplines with their associated KLA syllabuses, in which relevant ‘knowledge’ has already been organised. EfS is generally conceptualised in an holistic, multi-disciplinary way meaning that it constitutes a different ‘organiser’ for subject matter selection than the usual KLAs or subjects. In addition, EfS content is contingent upon local context, meaning the circumstances of any particular place. The subject matter therefore cannot necessarily be readily identified in advance. Furthermore, although factual knowledge in EfS has importance, teachers entering the profession now, with a potential career extending over 30 to 40 years, will inevitably have to cope with ever changing information relevant to EfS, therefore adding to uncertainty about what is of greatest importance. A final consideration is the definition of EfS. EfS may be defined (see Appendix 4.3 and Chapter 2, page 12), as more about learning processes than content. The issue remains, however, that without adequate subject matter knowledge, teachers will find it challenging to work with their students through issues related to, for example, water, biodiversity, consumer choice and energy use.

Whilst it has often been stated that knowledge gains are a necessary but not sufficient aspect of learning in EfS, it was anticipated by the tutors that the environment related content knowledge of the relevant cohort of pre-service teachers may not have been well developed (Taylor et al., 2006). For these reasons much effort was made to deepen pre-service teacher knowledge and understanding of concepts such as biodiversity; adaptation; interdependence; ecosystem services; conservation; water quality, quantity and sharing; soil erosion and salinity; materials used in manufacturing; waste disposal; consumer behaviour; sustainable consumption; technology and choice; inter-generational and intra-generational equity; energy flows, sources and consequences of use. Although content such as this was considered important, the processes of EfS were considered to be of greater importance and therefore content was used as a vehicle for the demonstration and practice of teaching strategies described later.

Because of the integrated nature of EfS in NSW, pre-service teachers' general pedagogical knowledge would make a significant contribution to their ability to adapt EfS into the primary curriculum. However, knowledge of pedagogical processes which are fundamental to EfS in particular is important because of the primacy of learning *processes* expressed in the aspirations of EfS as defined by Tilbury (1995), and in relevant policies (NSW DET, 2001a; ADEH, 2005), and because some of the learning processes that are key to EfS may be generally not well known. Knowledge of learning processes specific to particular subject matters has been termed pedagogical content knowledge (Grossman, 1990) and refers to:

- knowledge and beliefs about the purposes of teaching a subject at different grade levels;
- knowledge of students' conceptions and misconceptions of particular topics;
- knowledge of curriculum resources available for teaching particular topics; and
- knowledge of instructional strategies and representations for teaching particular topics.

Moreover in relation to the EfS unit, consideration needed to be given to the claim that the pedagogy that teachers experience as primary and secondary student learners is influential on their choice of strategies as teachers (see Miles, Harrison & Cutter-

Mackenzie, 2006 for a discussion). If pre-service teachers are to adopt teaching strategies intended to move their students towards a more sustainable way of life, it would seem appropriate to expose them to a broad range of potential strategies, and to encourage them to reflect upon these. In short, modelling was required. This was especially the case, as already argued, because a range of the teaching strategies advocated for EfS (ADEH, 2005) are not necessarily a part of everyday teaching in Australian schools (Tilbury, Coleman & Garlick, 2005).

Pre-service teachers can also gain pedagogical content knowledge from actual classroom experience during periods of practicum (Grossman, 1990). However because anecdotal evidence suggests an absence of EfS in many practicum schools, this would appear to be an unreliable source of EfS learning for pre-service teachers. Whilst the efficacy of an action research approach to the development of pedagogical content knowledge in EfS is acknowledged (Kyburz-Graber & Robottom, 1999; UNESCO, 2002; Tilbury, Coleman & Garlick, 2005), the organisational constraints of the teacher education institution prevented this from occurring to any great extent at the time.

Therefore developing pedagogical content knowledge through modelling of instructional strategies particularly relevant to EfS, and assisting pre-service teachers to connect these strategies to the existing primary curriculum, were considered important. In this way a wide range of learning strategies such as co-operative learning, critical thinking, first hand investigations in the field, multi-modal student presentations, learning through reflection on outdoor games and interactive web activities were used. Strategies appropriate in the primary school for developing systemic thinking, such as calculating ecological footprint (Powerhouse Museum, 2000), exploring the notion of carrying capacity and devising life cycle analysis of products (NSW DET, 2001b) were included. The content of the unit was as much about pedagogy as it was about the environment and assisted pre-service teachers to find and share useful resources that would support their teaching in later years (Kennelly, Taylor & Maxwell, 2008). Further details of the teaching practices selected for the unit are presented below under *Accepted teaching practices*, and the EDSE 412 content program is set out in Appendix 4.2.

4.4 Accepted teaching/learning practices

Tutors must make a value judgment about which experiences are most useful for pre-service teachers taking account of their needs over long teaching careers (Grossman, 1990; Firth & Winter, 2007) and their special position as beginning teachers (Furlong & Maynard, 1995). As well as anticipating that the pre-service teachers may have had limited experience in EfS, the tutors were aware of the opportunities and constraints that exist in contemporary schools, including the acceptability of EfS. To ignore these constraints during the pre-service period could result in novice teachers being unable to overcome many of the challenges they could face in attempting to provide effective EfS for their students (Grace & Sharp, 2000; Stevenson, 2007). Additionally, the tutors needed to be sensitive to the particular attitudes and needs of the cohort including the possibility that some pre-service teachers could feel lacking in knowledge (Taylor, et al., 2006) and confidence (Howitt, 2007) and that some could come from backgrounds where EfS could be associated with ‘greenies’ and may be unpopular (Gough, 1999; Whitehouse, 2001).

Choice of learning experiences was also influenced by those considered acceptable in official EfS documentation (ADEH, 2005); by the tutors’ constructivist view of learning (Meyers, 2006); the objectives of EDSE 412; consideration of aspects of the NSW Quality Teaching framework (NSW DET, 2003); and the need for assessment.

Assessment

The major assessment task for EDSE 412 was an inquiry learning project (see page 86). A comparable inquiry learning process is currently being advocated in the NSW Climate Clever Energy Savers Project (NSW DET Curriculum Support Directorate, 2010). This state-wide project requires participating teachers to adopt the inquiry learning strategy (called ‘project based learning’) with their classes. This means that the assessment task used for EDSE 412 was directly relevant to the conceptualisation of EfS currently being driven by NSW DET Curriculum Support Directorate. The inquiry learning assessment task was a purposeful learning activity and allowed pre-service teachers to experience a strategy which they potentially would be encouraged to adopt at a later time. Additionally, particular pedagogical objectives were assessed through a final examination as well as through assessment of student presentations

during workshop sessions. This was accepted assessment practice in the university at the time.

4.5 Examples of teaching and learning strategies adopted in EDSE 412

A selection of the teaching strategies employed during the unit is described below. This description is relevant because the various strategies used are later referred to in Chapter 5 and in the reports of case studies.

Experiential learning beyond the classroom

One full day and two part day sessions were expended in natural places where pre-service teachers were gaining ecological knowledge, as well as engaging in aesthetic appreciation designed to develop a conception of ‘what it is we are trying to sustain [ecologically]’ (Stewart, 2006:89). Two further part day sessions were expended in areas of technological interest in relation to sustainability, and additional short sessions were frequently conducted out of doors. It has been shown that experiential learning (defined variously as learning by doing, being in the environment, real life learning and sensory engagement in a local context) leads to greater student engagement than teacher directed methods; leads to greater student retention of whatever is learnt than teacher directed methods; and is particularly important in facilitating attitudinal and behaviour changes (Ballantyne & Packer, 2009). Experiential learning is congruent with EfS and the advantages associated with it were sought.

Social and environmental learning benefits for children through outdoor experiences have been reported (see Malone, 2008 for a review) and Skamp’s (2009) study indicates that teachers believed there were many positive benefits for children from outdoor learning. However in addition other issues were considered because some pre-service teachers may never have developed an ethic of environmental caring. According to Noone (2006:225):

An ethic of care is a creative response to place; a response intimately connected to our ability to be receptive to place. If the aim of environmental education is to develop an ethic of care then teachers must first learn to care; learning which is intimately linked with their own ability to be aware of and understand their relation to place.

One purpose of some of the outdoor experiences included in EDSE 412 was to encourage the pre-service teachers to develop a heightened awareness of the places they were in and the issues arising from those places.

In line with the kind of constructivist approach advocated by Shepardson and Harbor (2004), outdoor experiences were combined with opportunities to engage with relevant school-appropriate learning strategies in field conditions and to evaluate these. Time was also taken to explore parts of the local community and to demonstrate how pragmatic relationships could be built between schools, local council and other groups. All visits were exploited for primary curriculum links.

Beyond-the-classroom experiences included visits to nearby woodland to explore ecological concepts and procedures for class organisation for outdoor learning, and to an EEC catering for visiting primary children. The purpose of the latter was to raise awareness of EECs as a resource. Outdoor activities relating to weather, soil and cultural heritage were undertaken at this location. A visit to a local sewage treatment works was included. This occurred in conjunction with water studies, of processes such as filtration, of sustainable use of waste water as well as learning about the potential of partnerships between schools and local council. A visit to a world heritage listed national park was for the purpose of further developing ecological understandings, strategies for learning outdoors and aesthetic appreciation of natural areas. Finally there was a visit to a 'sustainable house' displaying design features that minimised the impact of the dwelling in terms of energy and water use. This visit was undertaken within the context of assessing 'appropriate' technologies, where the criteria of 'appropriateness' were contemplated, and included aspects of sustainability. As with other strategies these were intended to model good practice.

Inquiry learning

Pre-service teachers are thought to benefit from experiencing and reflecting upon interdisciplinary projects in the local environment (Kyburz-Graber & Robottom, 1999). This view also receives support in the *National Statement* (ADEH, 2005) and within interpretations of the NSW Quality Teaching framework (NSW DET, 2003) which is currently being strongly promoted state-wide in NSW schools (Smith &

Cupitt, 2007). Inquiry learning was the focus of an effective teacher education program, applying constructivist principles described by Shepardson and Harbor (2004:473) who believed that in order to learn the meaning of inquiry learning, teachers needed to use it, and that ‘doing inquiry learning best informed teachers about their own classroom practice’.

Given the tutors’ agreement with such an approach, interdisciplinary inquiry-based projects were planned and carried out. Inquiry learning involves an investigation into the physical and socio-political dimensions of an environmental issue with a view to influencing environmental practice for the better (Meyers, 2006). The inquiry learning process, (as described in the *National Statement* (2005) and summarised in Figure 4.1), was based on constructivist principles, encouraged students to take direction over their learning and to work on projects of real significance to themselves as advocated through NSW Quality Teaching (NSW DET, 2003). Pre-service teachers chose an environmental topic of concern to them, and were encouraged to actively and independently investigate their chosen topic in the context of the local environment. They were also required to explain how the issue was a manifestation of a broader issue of national and global significance. Amongst other things, social actions that pre-service teachers performed included voluntary land restoration with local Landcare groups, initiating campaigns in their residential colleges to reduce water or energy use, and undertaking relevant teaching segments with children in local schools. Opportunity was made available for pre-service teachers to undertake the latter action. This involved interested pre-service teachers in preparing a teaching segment relevant to EfS and teaching it to groups of children visiting the university from a local primary school. The preparation, teaching and reflection were part of the assessment task.

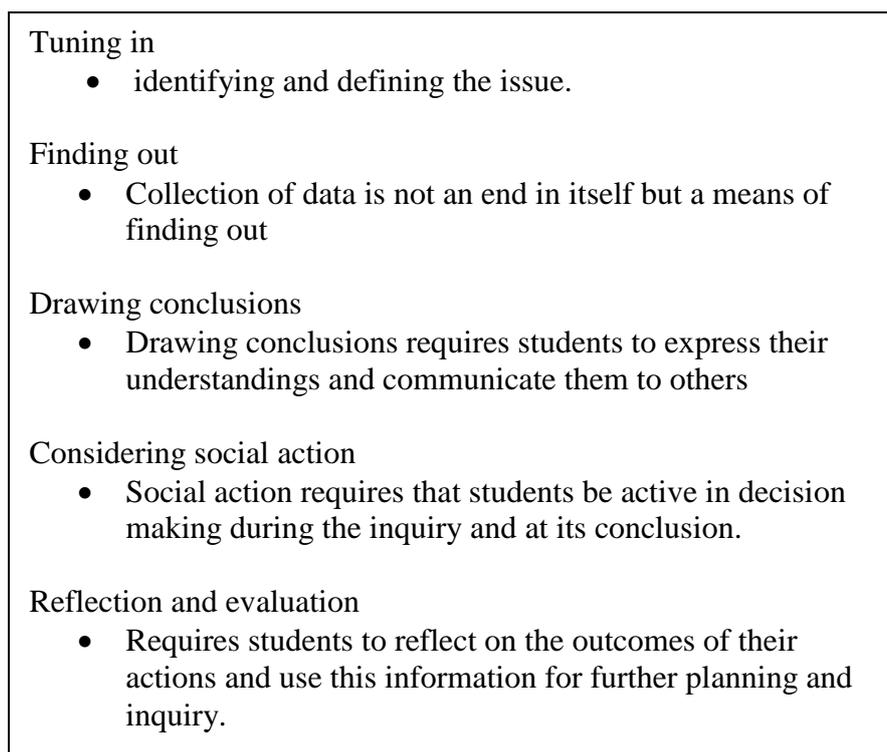


Figure 4.1: A model of inquiry learning (ADEH, 2005:21)

Planning for EfS

Further opportunities were provided for pre-service teachers to plan learning sequences in EfS that could be integrated into a number of Key Learning Areas across the primary curriculum in a classroom. These opportunities were intended to assist pre-service teachers to overcome some of the problems associated with incorporating EfS into an already crowded curriculum and to assist them to think of EfS in an across-discipline if not holistic way. A more holistic approach was broached where they were required to critique existing units of work against Jensen's (2002) model of learning for action competence (Appendix 2.4), and to construct their own units of work organised according to the components of Jensen's action competence model. When used as a planning tool in teacher education, the model can be said to address criticisms made in the past that professional learning related to the environment mostly focused on raising awareness and improving the environmental knowledge of teachers (Lane, et al., 1995; Henderson & Tilbury, 2004; Mastrilli, 2005; Tilbury, Coleman & Garlick, 2005).

Thinking critically in an environmental context

The aims of the *National Statement* (ADEH 2005:8), such as where EfS is seen as ‘a vision and a mission of personal and social change’ and involves empowering ‘citizens to be leaders in the transition to a more sustainable future’, are socially critical in so far as they imply a criticism of contemporary societal values as well as implying a need for active change. Where such goals are considered to be valid, there is an implication that teacher education should incorporate opportunities for a critical analysis of values, identification and evaluation of human impacts, evaluation of options for the future and the skills of personal and collective decision making. The inquiry learning project already described required some practice of these skills.

In EDSE 412, pre-service teachers experienced a number of classroom strategies that could assist in values analysis (for example, using the questions provided in Appendix 4.4 to compare views on local biodiversity issues from printed local media, local interest groups and official government literature) and values clarification, where pre-service teachers were required to analyse their own position on an issue (for example, with a polarised debate about use of nuclear energy). Many materials currently used in NSW primary schools were used in EDSE 412. As an example, the questions selected and provided for values analysis (Appendix 4.4) were derived from routine professional learning that occurred in a local school, and therefore this kind of activity was construed as acceptable and relevant in primary school learning.

The whole school method of change towards sustainability implies a critical attitude to contemporary practice. The whole school approach to EfS is a mainstay of the NSW *Policy* (2001a) (see Appendix 4.3). Within the unit, pre-service teachers had opportunities to examine the processes of whole school approaches to environmental education (Henderson & Tilbury, 2004) and the associated collaborative social change emphasis of many of the exponents of EfS (Fien, 1993b; Huckle, 2005a).

Specific strategies for stimulating thinking, applied in an environmental context and used in primary education, were trialled and evaluated by the pre-service teachers. The importance of developing critical thinking skills within a specific context (in this case, an environment related context) has been emphasised by Bailin et al (1999).

Strategies included reflection following the auditing of school waste and energy use, auditing of personal water use, assessing alternative technologies according to their environmental and social impacts, using de Bono's thinking hats to assess teaching materials, reflecting on ecosystem services that may have diminished in recent years, playing and reflecting on games that illustrate the impact of feral animals on ecosystems, and assessing how decision making across political, social and economic systems has affected wheat belt landscapes in Western Australia. Inviting pre-service teachers to actually engage in many such activities was intended to encourage them to construct ways in which the underlying concepts could be taught in their own classrooms. Additionally, strategies for thinking about the future are important given that EfS is about change for the future, and given the emphasis placed on 'visions for the future' (Jensen, 2002; Tilbury, 2004). Appropriate futures thinking strategies for primary schools identified from NSW *Sustainable Schools* materials (NSW DECC & DET, 2006) and from *Quality Criteria for ESD Schools* (Breiting, Mayer & Mogensen, 2005) were practised and evaluated by the pre-service teachers.

4.6 Overview

When Oulten and Scott (1995:226) described the general aims of their pre-service teacher education course, they listed two main purposes. Their first purpose was that beginning teachers should be willing to contribute to socially critical environmental education in their teaching, in the sense of understanding its importance and having a personal commitment to it. Their second purpose was that beginning teachers should be able to contribute to socially critical environmental education in the sense of having a range of strategies upon which to draw 'in co-operation with others'. The pre-service unit prepared for implementation and described for this study shared these aims.

The unit went some way to addressing shortcomings of teacher education in EfS identified by Tilbury, Coleman and Garlick (2005:49), namely it:

- included whole school approaches;
- added to environmental knowledge;
- attempted to cross subject boundaries even though it was offered by the science team of teacher educators; and

- included pedagogical components of EfS such as envisioning, critical thinking, values clarification and systems thinking that had been identified as absent in teacher education.

Action research approaches to EfS were strongly advocated by Tilbury, Coleman and Garlick (2005) on the basis of successful procedures used in the ENSI program (Kyburz-Graber & Robottom, 1999) but this strategy was not developed within EDSE 412.

From here the following chapters describe the findings of the research. Chapter 5 reports on phase one of the study and the ensuing chapters report on the case studies that constitute phase two.

Chapter 5: How does the EfS unit EDSE 412 impact on a cohort of pre-service teachers?

The purpose of the phase one investigation was to respond to the question: *How does a teaching unit in EfS impact on pre-service teachers?*. meaning specifically, to understand the impact of *Education for Sustainability for the K-6 Curriculum* (EDSE 412). The report in this chapter draws upon survey information gained at the beginning and at the end of EDSE 412. Information is also drawn from interviews held at the conclusion of EDSE 412 (Interview A) in order to illustrate survey themes with more extended explanations. Phase one information includes the views sourced from surveys of those who would ultimately be a part of the longitudinal study. A comparison of their responses to those of the cohort would add to the validity of the case reports.

5.1 Views surrounding environment and teaching

When pre-service teachers (N=104) were surveyed (Appendix 3.1) as to how important environmental problems were to them (QA8; QB8), the responses at both the beginning (T1) and end (T2) of EDSE 412 were largely unchanged. Interestingly environmental problems were perceived as at least ‘important’ by all respondents and ‘very important’ to over one third of respondents (Fig. 1).

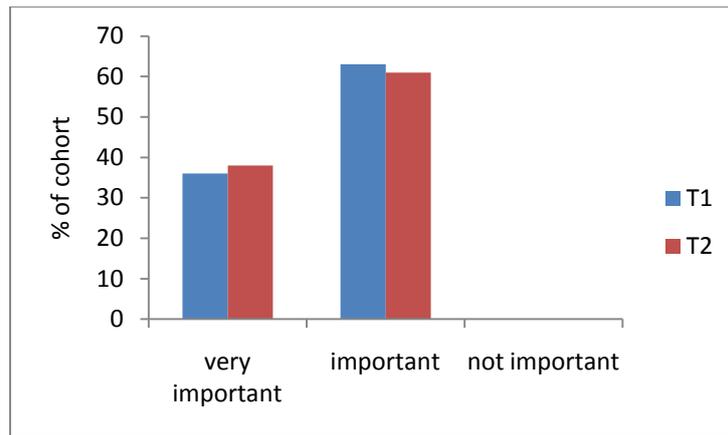


Figure 1: Pre-service teachers' responses to 'How important are environmental problems to you?' at the beginning and end of the unit.

Furthermore, with one exception, all believed that through their teaching, they could play an important role in addressing environmental problems (QA7c; QB7c), a view that remained largely unchanged (Fig. 2).

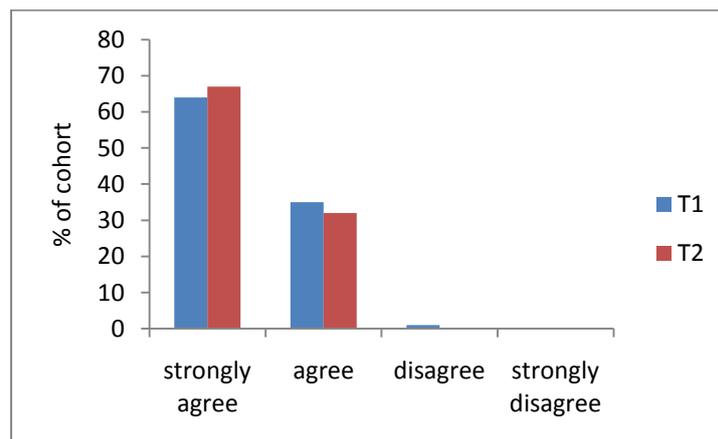


Figure 2: Pre-service teachers' responses to the statement 'Teachers can play an important role in solving environmental problems through teaching' at the beginning and end of EDSE 412.

When, during interview at T2, pre-service teachers reflected on aspects of EDSE 412, they revealed some ways in which they believed their teaching could play a role in solving environmental problems. As an example, Mick¹ felt that as a teacher he could influence children's ideas in the direction of conserving:

¹ Pseudonyms have been used to protect the identity of those participating in Interview A.

I think what it comes down to is changing students' ... goals and their ideas that they have now. Because I have a feeling: we are just taking so much from the world and we are not giving anything back and I think society's poorer for that [Mi:intA:T2]².

Whilst participants seemed to believe that teaching was a profession that could have a positive role in solving environmental problems (Q7c), this conviction did not necessarily translate into an optimistic outlook on the future. A large portion (60%) believed the future environment would be worse, with almost a further 10% believing it would be much worse (QA6; QB6) (Fig.3). This pessimistic view was largely unchanged by the end of the unit suggesting, as Pajares (1992) claimed, that beliefs once held are likely to remain constant.

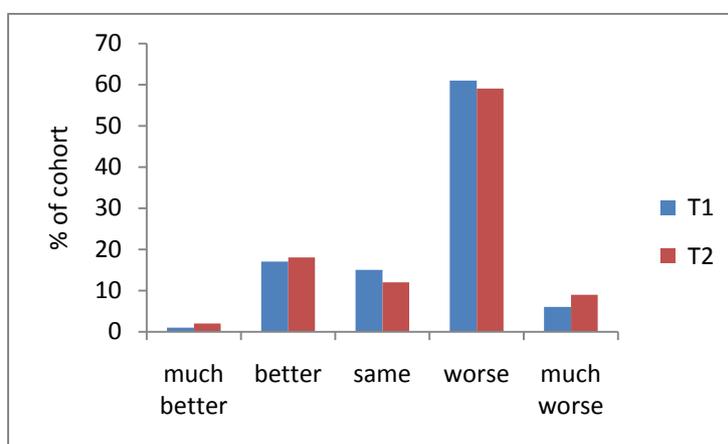


Figure 3: Pre-service teachers' responses to the statement 'In the future I think the Australian environment will be ...' at the beginning and end of EDSE 412.

Despite this, some views did alter over the duration of EDSE 412. For example, while all the pre-service teachers at T1 believed they could help the environment (QA7a; QB7a), by T2 those who *strongly* agreed with this sentiment had increased from 32 to 52% (Fig.4). Thus, despite a general feeling of pessimism about the future, this group felt their capabilities to do something positive in terms of sustainability had increased.

² This notation will be used in Chapter 5 to indicate the source of information. In this instance the interviewee is Mick (Mi); participating in Interview A (int A); at the conclusion of EDSE 412 (T2).

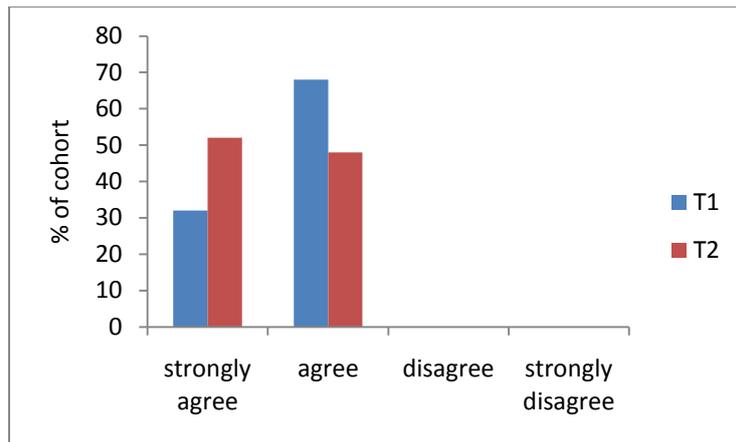


Figure 4: Pre-service teachers' responses to the statement 'I can help the environment' at the beginning and end of EDSE 412.

The interviews at T2 illustrate mechanisms through which pre-service teachers felt they had learnt to help the environment, meaning how that understanding had developed. In the following example, Connie explains how she had learnt that she could change the way she and her household handled waste towards a more sustainable way. She attributed this learning to the inquiry learning project wherein pre-service teachers were required to inform themselves about an issue of their choice and to then act upon what they had learnt:

Connie: The inquiry learning project actually brought it [sustainability] into my own context. I started recycling and I got everyone else in my home to recycle and we physically saw how much less rubbish there was. I visited the recycling centre and that was really positive. They took me right through and that was very valuable, very informative. And after going to the recycling centre everything we've done in [412] has come into perspective more [Con:int A:T2].

Furthermore, a proportion of the cohort, believed that their knowledge and skills to bring about improvements in the environment had increased as a result of completing EDSE 412. The proportion of participants who believed their knowledge and skills could bring about environmental improvements to be either high, or very high was 37% at T1. By T2 this figure had risen to 72% (Fig.5).

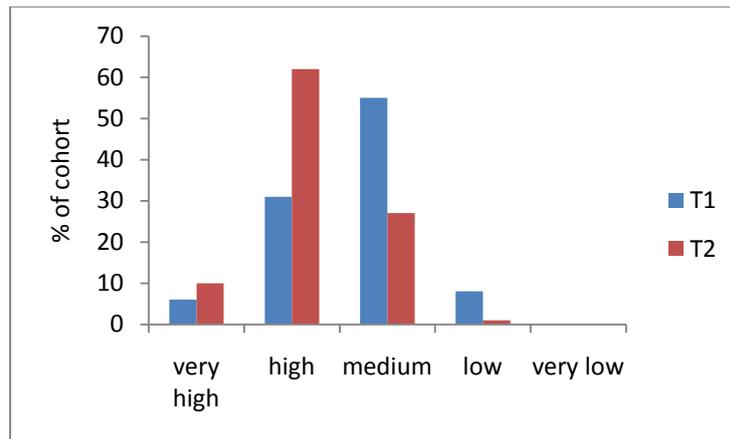


Figure 5: Pre-service teachers' responses to the question 'How would you rate your skills and knowledge to bring about environmental improvements even if it is only in a small way?' at the beginning and end of EDSE 412.

As an example, at the completion of EDSE 412, Mick believed his skills to bring about environmental improvements had increased through the experience of:

being able to see how you can actually implement an environmentally friendly process: where I actually experienced trying to change my ways with water use in my own household. My fiancé has been wondering why I have been so environmentally friendly [Mi:int A:T2].

Mick attributed his improvement in the skills of living more sustainably to the inquiry learning project and to other examples of experiential learning beyond the classroom, all of which had contributed to his practical understanding of how improved sustainability could be operationalised.

EDSE 412 had been prepared in response to current thought in EfS and to Australian policies, both of which have been discussed in Chapter 2, but also at a local level, attention was given to the nature of the particular student cohort enrolled and the context of primary schools in NSW. Whilst remarks such as those above from Mick are useful to the tutors at a local level, informing them of how they might better shape the detail of their teaching, of more general significance is the manner in which the pre-service teachers responded in terms of their motivation and confidence to engage with EfS. This is because, in line with Oulten and Scott (1995), the general purpose of EDSE 412 was that pre-service teachers should be willing to engage with EfS, and feel able to do so in the sense of having a range of strategies to draw upon. Therefore, in the following sections, particular attention will be given to these latter parameters, both of which had been explored through survey and interview.

5.2 Motivation

Pre-service teachers were asked at T1 and T2 to rank their desire to include EfS in their work and then to write a short explanation for their ranking decision (QA1,2; QB1,2). Initially (T1) 76% of the cohort held a ‘strong’ or ‘very strong’ desire to include EfS in their work (Fig.6), with one quarter of the cohort accrediting their main motivation as concern for the future: ‘If we don’t educate and teach students how to preserve the environment there won’t be one in the future’ [SurvA:Q2]³ (Appendix 5.1: Table 5.1). Some, whilst sharing concern for the future as their motivator for including EfS, looked more positively upon the potential for EfS to contribute to sustainability: ‘I think it is important for children to have knowledge in this area so they can be aware they can make a difference in the environment’ [SurvA:Q2].

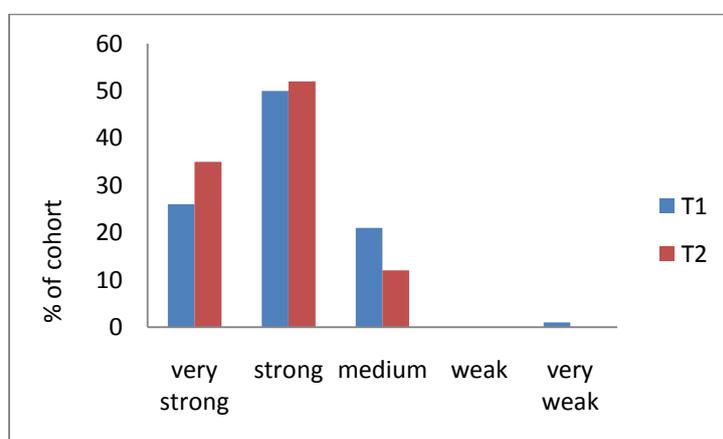


Figure 6: Pre-service teachers’ ranking when asked to ‘Rate your desire to include Education for Sustainability in your teaching’ at the beginning and end of EDSE 412.

Approximately 16% of the cohort explained their motivation at T1 for including education surrounding sustainability as an expression of care for the environment: ‘Sustainability education is essential to preserving flora and fauna’ [SurvA:Q2]. Others referred explicitly to children, mentioning that children ‘need to know’ or ‘need to care’ and ‘need to act responsibly’. There were those less motivated by the concept of EfS generally and 14% of the cohort at T1 expressed the opinion that other

³ In this chapter, the source of remarks recorded in response to open survey questions is acknowledged thus: ‘[SurvA:Q2]’. In this case ‘Surv A’ refers to the survey at T1, and ‘Q2’ refers to Question 2 in that survey.

things in the curriculum (especially English and mathematics) were more important as in ‘I think the most important things to teach children are maths and English first’ [SurvA:Q2]. Some few also admitted to never having before thought about sustainability as part of teaching (Appendix 5.1: Table 5.1).

At T2, the proportion of the cohort holding a strong or very strong desire to include EfS in their teaching had increased from 76% to 87%, with approximately one third of those having a very strong desire to do so (Fig.6). Seventeen percent of the cohort explained their motivation in terms of their belief in the role of education. As an example: ‘I am concerned about sustainability into the future and I think education is the best way of addressing this’ [SurvB:Q2].

In an example from an interview at T2, Elisabeth was concerned about the effect of environmental issues on children. She responded to a question about how her motivation had changed over the duration of EDSE 412 by identifying the importance of actions that contributed to the resolution of environmental problems:

It [EfS] has definitely had a positive influence. I knew about environmental issues before I was involved in this unit but I didn’t have any idea how to teach it, the action part of it. I just felt before, that I would scare the children if I taught them about environmental issues. I didn’t know the way to teach them how to do something about it ... but now I think I do [Elis:int A:T2].

Elisabeth’s opinion of environment-related teaching had changed. She revealed her conceptualisation of EfS at T2 as including action for the environment, action which she observed could potentially dispel worry initiated by environmental issues, in a manner described by Fien (2000). Her conceptualisation of EfS is also compatible with Tilbury’s (1995) definition of EfS as action-oriented in the sense of encouraging learners to personally and collectively take action towards sustainability. Without this understanding, Elisabeth may have avoided EfS in her teaching. This example also demonstrates something the tutors observed: it became apparent that pre-service teachers were becoming more enthusiastic about EfS, as they became familiar with a growing number of strategies that they could use in the classroom and as they

increasingly understood how EfS could ‘fit’ within the primary curriculum [res. diary: 28.3.07]⁴.

Approximately one tenth of the cohort also stated that their motivation had increased as a result of increased awareness and understanding. As an example, one individual at T1, ranked her desire to engage with EfS as ‘weak’. At T2, this individual selected ‘strong’ saying that ‘this unit has made me aware just what dire straits our environment is in. It needs saving and our future generations need to be taught why and how to do it’ [SurvB:Q2]. In an example from interviews at T2, Connie attributed increased motivation to engage with EfS to knowledge gains:

It sort of makes more sense. I understand ... like I knew global warming was an issue but really I had no idea what it was. I just knew the climate was warming. Now I understand how it works. And that’s really motivated me [Con:intA:T2].

In a further example from interviews at T2, Alan attributed increased motivation to engage with EfS to knowledge gains:

just the increased knowledge I have now on environmental issues. Now I see the importance of acting quickly rather than sitting back and waiting for someone else to do it. That has motivated me to integrate EfS into my other teaching plans [Al:int A:T2].

In explaining that increased knowledge contributed to motivation, he additionally explained how knowledge gains impacted on his perception of his responsibility to engage with EfS. Tilbury (1995:202) conceptualised EfS as allowing for an ‘exploration of moral, social and political values’ in the development of an environmental ethic. Alan, having learnt more about environmental issues, felt that his own moral position had changed and that he was obliged to act upon his new knowledge. He attributed this ethical position and his motivation to particular activities in EDSE 412:

things like the ecological footprint, little strategies like that we used to analyse our own behaviour ... that’s been a big thing. From that you can pick out things you can do to make a difference. You’re more empowered. You know what to look for [Al:int A:T2].

⁴ [res. diary: 28.3.07] acknowledges the tutor/researcher’s diary as the source of information

Another interviewee, Paul, attributed his motivation to engage with EfS to his ethical position:

Paul: Thinking about the rights of species other than people is motivating for me. There's other factors than ourselves worth taking into account and I don't feel a lot of people have that attitude. It's all about us: we can adapt to all this change and survive, while they [other species] can't. We can just build our homes higher up or whatever [Pa:intA:T2].

Paul attributed his ethical position to specific experiences within EDSE 412:

The ecological footprint. That motivated me. I think as Australians we don't think we're mean people ... but once we actually compare our footprint with people from other countries it maybe hits home. Well it hit home for me how important EfS is [Pa:intA:T2].

Also motivating for Paul also was:

Finding out things you can do to make a difference. I felt EfS is all about power. Everyone, even a kid has the power of making a difference [Pa:intA:T2].

In line with Tilbury's (1995) definition, Paul was expressing a conceptualisation of EfS as socially critical and as with Jensen (2002) and Fien (2000) he identified that EfS could provide individuals with the power to act. Further, Paul made clear his motivation to engage with EfS on the grounds of its purposefulness:

This [EfS] you can use and it's going to affect you no matter what job you go to. It's not an idle thing they make you learn for the sake of learning [Pa:intA:T2].

Less motivated respondents pointed to other curriculum responsibilities: 'the curriculum is already crowded enough' and 'I feel more strongly about focusing sessions on literacy and numeracy' [SurvB:Q2]. An open question asking participants to reflect on change, or lack of change in motivation through EDSE 412 (Q9) in the main revealed neither additional nor conflicting information. One individual however in response to Q9 provided an insight into her thinking: 'I believe unbiased education is important and students have a right to make a decision' [SurvB:Q9]. This reflective individual appears to hold some reservations about EfS and perhaps even the way it was presented. This view, that has been noted amongst teachers elsewhere (Cotton, 2006), is a reminder of the importance of presenting knowledge as problematic and of providing a space for conflicting opinions as is consistent with a socially critical approach (Robottom & Hart, 1993).

5.3 Confidence

At T1, just 35% of the cohort expressed confidence (QA3) to engage with EfS (Fig.7). Approximately half of those who expressed a feeling of confidence attributed this to either strong interest or strong personal values: ‘My confidence comes from my passion for a better world’ [Surv A:Q4] (Appendix 5.1: Table 5.2). Others, amounting to almost 10% of the cohort, accounted for their feelings of confidence by referring to their existing knowledge of the environment, for example, ‘I come from a family of science and environment-minded individuals’ [SurvA:Q4]. Respondents were sometimes reserved in their expression of confidence, being keen to proceed, but uncertain of their capabilities to do so: ‘I’m very eager to implement environmental sustainability into my teaching and believe I will be able to teach it effectively, but I feel I have a lot to learn about many current environmental issues’ [SurvA:Q4].

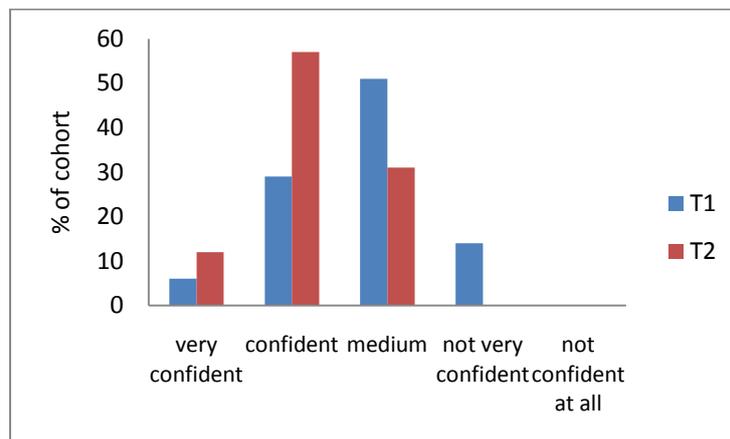


Figure 7: Pre-service teachers’ response to the question ‘How confident are you about including Education for Sustainability in your teaching?’ at the beginning and end of EDSE 412.

The majority of the cohort indicated a lack of confidence to engage with EfS at T1 (Fig.7), selecting either ‘medium’ or ‘not very confident’. Over one third of the cohort specifically attributed their lack of confidence to a shortfall in knowledge: ‘I don’t feel as though I know enough about the issues’ [SurvA:Q4] and ‘During my school years I have had little education on sustainability and therefore I have limited knowledge on the subject to teach my future classes’ [SurvA:Q4]. This finding is consistent with that of Cutter-Mackenzie and Smith (2003) and Miles, Harrison and Cutter-Mackenzie (2006).

Additionally, almost 20% of the cohort remarked on their lack of pedagogical content knowledge in this area: ‘I want to include it but I’m not sure exactly how to go about it in a way that will both motivate children and fit into the school curriculum’ [SurvA:Q4]. Others commented on how EfS had not been a part of their school experience during practicum: ‘I have not come across it in any of my pracs and have not seen it in any of the schools I have taught at’ [SurvA:Q4] and at T1 this contributed to a lack of confidence.

However by T2, the proportion of individuals who expressed confidence in their ability to engage with EfS had almost doubled to 69% (Fig.7). Confidence at this time was attributed to a number of factors. Over one third of the cohort referred to having acquired knowledge and understanding: ‘[I feel confident] from learning about environmental issues in depth’ [SurvB:Q4]. Particular strategies had been used during EDSE 412 to both model practices advocated in EfS, including co-operative and experiential learning (ADEH, 2005) and to concurrently augment pre-service teacher knowledge and understanding of environmental issues. Pre-service teachers responded positively to teaching strategies such as co-operative learning where they worked in groups to research different aspects of an issue of their choice [res. diary: 19.3.07]. In another example, a visit to the local sewage treatment works seemed to facilitate understanding of concepts such as ecosystem services, scientific understandings about water quality, the need for public education about use of the sewerage system and the triple bottom line, meaning how environmentally responsible treatment of sewerage could also be of economic and social advantage to the community [res. diary: 22.3.07]. From interviews at T2, came further remarks connecting confidence with growing understanding. As an example, Amy explained that she felt more confident from:

being exposed to it a bit more and understanding at a deeper level myself. Like if I go into the classroom I do know the more scientific stuff: if I do get that student who puts their hand up and asks a more difficult question I’d be more confident that I’d be able to answer it or direct them to a way to find the right answer.

Over one third of the cohort attributed confidence to the acquisition of new skills and exposure to resources and teaching strategies: ‘The pedagogy taught within EDSE

412, the practical teaching examples and my experience within field trips have allowed me to construct a view of how I would approach EfS within my classroom and school' [SurvB:Q4]. During interview participants sometimes mentioned both subject and pedagogical knowledge as having contributed to confidence. Similarly this has been reported by Grossman (1990). One interviewee at T2, explained how this was the case for her, and she was able to link increased confidence to specific elements of EDSE 412:

Belinda: I think doing our inquiry learning project that we had to do: that gave me a bit more confidence because I've actually participated in what I expect the children to do. Also it has increased my knowledge base. It has increased what I know about environmental issues because I only knew what was in the media, but now I know where to go for other resources ... including web resources and published teaching units. That's what really gives me confidence is knowing how to teach it. This is what you could do in a classroom. And I may not use it as is, but there's somewhere to start from [Bel:intA:T2].

Belinda also derived confidence from her understanding that EfS was about social change and that there were strategies for developing this notion in the classroom. She commented on which experiences added to confidence:

I guess it's these action ones 'what we can do to make a difference': the literature and the hidden values. That really gave me confidence to do it [EfS] because it gave me a strategy with which I could initiate the discussion. So I'd use that and because as I mentioned before, my main awareness of environmental issues comes from the media, I think it's really important to listen to what they're [the media] saying, and to make your own judgment on it as well. So if you help children develop that skill that's important I think [Bel:intA:T2].

In a further example that linked increased confidence to specific experiences in EDSE 412, Paul explained:

Actually I didn't have very much confidence, but it improved: just with the inquiry learning ... I was keen to do research to see how much information there is out there. Just the trips we take: it showed me practical ways of teaching. I probably understand now that you can't make a difference just by teaching from the text book. The children have to be involved. That's the main thing.

And probably things like mapping the stormwater drains, sample activities. Just from doing it here for 10 minutes, I started to say to myself 'This is pretty simple to do' [Pa:intA:T2].

Actual experience of teaching strategies was important [res.diary:3.4.07] as a means of building confidence, especially because many of the pre-service teachers appear not to have experienced EfS elsewhere. During interview one individual remarked:

It [EDSE 412] has definitely increased confidence because EfS wasn't a major consideration for me beforehand. It was an eye opener and I immediately felt I had more to work with which in itself added to confidence. For me it's provided certain tools for teaching. Having gone through it yourself and experienced it, and a lot of the things we did were experiential learning, being able to experience it yourself gives you confidence to use it [Al:int:T2].

One interviewee commented that practice of programming activities added to confidence:

I think Jensen's model was a key above everything. It was a good way to actually program. It's given me a process that I will be able to put into my program [Mi:intA:T2].

Although by the end of the unit, the majority of the cohort claimed to be either confident or very confident in their ability to engage with EfS, approximately one third still held reservations. Most of this group still felt they lacked knowledge: 'I choose "medium" because I have a lack of knowledge, because this year is really the only year of dealing with this subject' [SurvB:Q4]. Lack of familiarity was evident from observations that some pre-service teachers appeared to be inexperienced with being in natural places, to have difficulty in identifying differences between ecosystems, to being unfamiliar with the systems thinking required to understand notions such as life cycle analysis and ecosystem services and to struggle with concepts related to ecology [res. diary: 2.4.07].

Others lacked confidence because they had no experience actually implementing EfS. However, those pre-service teachers who took advantage of the opportunity to work with primary children visiting the university were pleased with the experience [res. diary: 2.4.07]. During this episode they were observed, as could be expected for novices, to have difficulty with timing of activities and in pitching work to the children's level of understanding. The pre-service teachers remarked upon these difficulties themselves but identified this practice teaching opportunity as a very positive experience that allowed them to develop these particular skills [res. diary: 2.4.07].

A small number of participants provided thoughtful and perceptive remarks: ‘I think that it might be difficult to impose EfS on a highly structured school curriculum that doesn’t value it in itself’ [SurvB:Q4]; ‘[My choice of “medium”] is more to do with “will I be able to implement it into the classroom” and being a young teacher whether the school will be accepting of it’ [SurvB:Q4]. Another ranked her confidence as ‘medium’ because of concerns about ‘crowded curriculum and support of the whole school’ [SurvB:Q4]. These three latter remarks all came from individuals who expressed either a strong or very strong desire to engage with EfS in the classroom. It appeared that they identified a mismatch between EfS as presented at the university and the realities of schooling as they had experienced it, presumably through their practicum experiences. This mismatch could be expected given the report that whole school approaches to EfS are poorly represented in Australian schools (Tilbury, Coleman & Garlick, 2005).

The survey showed that approximately one third of the cohort came to EDSE 412 with confidence in their abilities as teachers of EfS. By the end of EDSE 412, almost one third still lacked confidence, selecting ‘medium’ in response to a question on how confident they felt. As Bandura (1997) reported, confidence is important in influencing both willingness to engage with particular teaching practices and application of effort to attain goals. These survey results suggest that a single pre-service teacher education unit may not necessarily be adequate in terms of establishing a confident attitude to EfS in those about to embark on their teaching careers. However the analysis indicated that the particular strategies adopted did make a difference to at least a large minority of pre-service students in terms of feeling confident.

5.4 The five case study participants and their views as pre-service teachers

Following EDSE 412 the pre-service teachers completed a ten week internship in NSW primary schools. Five who had volunteered to be a part of the longitudinal part of this study went on to find employment. This sub group were not necessarily representative of the larger cohort, but the following information indicates where they were aligned in terms of the survey questions. In particular it informs the question:

Does the survey suggest that the five case study participants were unusual, in relation to the cohort of pre-service teachers, in terms of the views they held prior to internship experience?

Some of the five believed that the environment in the future would be worse but all were otherwise optimistic at T2. All claimed that environmental problems were very important to them (QB8), that they could help the environment (QB7a) and that as teachers they had an important role in solving environmental problems through teaching (QB7c). They were not unusual amongst the cohort in making these responses (Fig.1; Fig.3; Fig.2). Broadly, these data do, however, indicate that they were amongst those who were more eager to be involved in EfS. This conclusion is further supported by additional data which placed the rankings of the case participants amongst the 87% of the cohort who held a 'strong' or 'very strong' desire to include EfS in their work at T2 (Appendix 5.1: Tables 5.3 and 5.4). Their pseudonyms for this study are Andrew, Annie, Sue, Trudy and Tony.

At T2, three of the case participants ranked themselves as 'very confident' to engage with EfS (amongst 12% for the cohort), suggesting that as a group they may have believed themselves to be rather more confident than did most in the cohort. Sue and Andrew ranked themselves as 'confident' (along with 57% of the cohort) (Appendix 5.1: Tables 5.5 and 5.6). Whilst Annie retained her T1 high ranking of 'very confident' and Sue retained her T1 ranking of 'confident', three others ranked themselves as having experienced an increase in confidence between T1 and T2. All three attributed their increased confidence to improved knowledge of subject matter and pedagogy. This reason also was common amongst the cohort.

5.5 Summary

This chapter has provided a response to the question: *How does a teaching unit in EfS impact on pre-service teachers?* in terms of their motivation and confidence to engage with EfS. The survey and interview information suggests that pre-service teachers were concerned about environmental problems and that only approximately one fifth believed that there would be improvements in the environment in future. Even so,

they agreed that they could help the environment and that as teachers they could play an important role in solving environmental problems.

From the analysis, pre-service teachers' desire to include EfS in teaching was high and this desire increased over the period of EDSE 412, with participants commonly acknowledging increased awareness of issues and new understanding of ways of engaging with EfS as contributing to any change in their views. Significantly, the survey information also showed that levels of self-ranked confidence to engage with EfS rose over the period of EDSE 412 and this was consistent with my own observations. This change was commonly attributed to new knowledge and exposure to effective teaching strategies.

In the following five chapters of this study, the experiences of the case study participants will be individually reported. These chapters will be followed in Chapter 11 by a cross case analysis which will draw together findings from the individual cases.

Chapter 6: Trudy

6.1 Organisation of the case reports

In response to the question: *In what way does the beginning teacher engage with EfS and why?* each case report (Chapters 6 to 10) is organised as follows. Firstly the context of the school is described, including its physical setting and its culture as expressed through the views of various stakeholders in the school. Attention is then turned to the beginning teacher, to the environment- and teaching-related views that he or she expressed in the final pre-service year, and then to current views as teacher in the school. This is followed by an account of the beginning teacher's activity in relation to EfS wherein teaching decisions are linked to the description of context and beginning teacher perspectives already described. Finally there is a section that links the activity of the beginning teacher to the university unit on EfS. Note that pseudonyms are used throughout to protect the identity of participants.

6.2 Trudy at Rosewood Gully Primary

Trudy is a conscientious, articulate and dedicated teacher, working in a developing urban fringe area.

6.3 Context of the school

Rosewood Gully is a primary school, 25 years old and with an enrolment of 270 students and 11 class teachers. Physical aspects of the school that are potential resources for EfS include attractive native trees and gardens, available albeit limited water, including stored rainwater, some special building features such as skylights and suitable locations for new gardens. A fence around the school discourages vandals.

The wider school community, meaning the setting of place and people, may be influential on the uptake of EfS in a school. Much housing in the vicinity of this

school is new and of medium and high density. It is known as a housing commission area meaning that many of the occupants are likely to be less wealthy than average. There are few backyards for children to play in. In contrast there are public green areas available as well as remnants of bushland. Native birds of several varieties are present in the school yard and this would be attributable to the proximity of a nearby extensive bush reserve.

Almost half of the children used English as a second language reflecting the migrant and refugee status of many in the school population. Parents strongly supported multicultural celebrations held in the school but there was no person from the broader community who was actively assisting with environmental programs. Trudy, the principal and other teachers who were asked to comment, believed that issues of environment were unimportant for people in the community. Teachers at this school described it as a 'good' community and considered that they were lucky to work there.

6.4 School culture

School culture refers to the norms and patterns of interaction that occur within the school (Cherubini 2008). Routines, the approach of the principal and professional tasks that teachers were expected to perform, will be discussed first.

Trudy, as a teacher of children in their third school year, was part of the Stage 1 (Years 1 and 2) teacher team who together planned the term's work. There was an agreed scope and sequence of teaching units that all children followed in Stage 1 and it was expected that this would be adhered to [Tr:int:20.10.08]⁵. In this way the Stage 1 teachers functioned as a team, assisting Trudy in a very practical way, that is, they shared ideas and resources with her. Trudy's supervisor, Juanita, was in this team. Trudy held her in high regard. This person functioned in a positive way as a professional supervisor, routinely scrutinizing Trudy's teaching program and providing guidance. She took responsibility for ensuring that Trudy, as a new teacher,

⁵ The source of all information and quotations in the case study reports will be acknowledged using this format. 'Tr' acknowledges the speaker (Trudy); and 'int' the data type (interview), followed by the date upon which the record was made.

met the particular requirements of the NSW Institute of Teachers for newly employed teachers.

There was a whole school focus on teaching of 'basic skills' in English and mathematics. This was particularly emphasised by the principal, Trafford. He reinforced this priority by organising experienced teachers to work with new teachers and by employing specialist staff to assist with literacy teaching. The principal also encouraged a culture of adopting new technologies and new teaching methods.

Despite the attractive appearance of the school, there was no mention of environment related activities in the 2008 School Plan nor in the newsletters for two terms for 2008, all of which were examined. None of the teachers, with one exception, appeared to know of the existence of DET Environmental Education Centres in the region.

None-the-less teachers in the school participated in some environment-related activities. There was a buddy scheme where Years 6 and 1 carried out garden maintenance together. Additionally, there was broader participation in a whole school recycling scheme that Trudy described as follows:

There's recycling of paper and aluminium cans. The cans are brought in by the children. There's a paper recycling bin in every classroom. It's been in place for quite some time and it's sort of like a leadership program that's run by the 5/6 students. So they have a roster and they collect paper and cans. Then they collate information about what is collected and they bring an award to the next assembly. A class from infants and one from primary are given an award.

Interviewer: So the Year 5 and 6 are in control of the system?

Trudy: It's sort of a system that when they get to year 5 and 6 they help run that. They do the records and the awards. Mungo oversees it but the children do all of that themselves. They're getting quite imaginative with their awards. My children enjoy it. Our can basket is full this week so they're very excited about our assembly on Thursday because they may get the award. With the paper recycling they know they won't win it if there's food or anything in there so they're very particular about putting the right thing in there [Tr:int:19.10.08].

Conversations with Year 6 children revealed that they routinely checked paper collected, for plastics and other contamination. This scheme is consistent with ESD1 (Vare & Scott, 2007) with young students being guided towards positive actions through incentives and the effects measured as reduced environmental impact.

However it was more than ESD 1 for the Stage 3 children who took responsibility to act collectively in maintaining the system, to make some decisions, and influence others in the school through promulgation of information and provision of encouragement. This recycling scheme, overseen by the Year 6 teacher, Mungo, provides an example of 'collective action' as described by Jensen (2002). Whether or not other precursors to action competence in the sustainable use of resources were part of the Stage 3 student experience is unknown.

The school acknowledged its multicultural nature, in particular through celebration of a multicultural day. Parents attended on this day bringing traditional foods and helping with special activities for the children. Australian cultural heritage was also acknowledged in the school with routine daily singing of the Australian national anthem and encouragement for the use of English.

Also a part of school culture are the underlying attitudes and expectations of personnel in the school. These attitudes and expectations are thought to affect teacher morale (Cherubini 2008). Trafford, who had been the principal for almost one year made his expectations very clear:

Being the principal of the school I want [teachers] to teach literacy and numeracy better than anything [Tra:int:21.10.08].

The principal's view was that literacy and numeracy education had overriding importance. He repeated this opinion, reported to be common throughout many countries (Dworkin, Saha & Antwanette, 2003; Gruenewald & Manteaw, 2007; McLeod, 2007; Stevenson, 2007) eight times within the course of a thirty minute interview. Trafford attributed his prioritisation of literacy and numeracy to directives from the NSW DET and to the influence of the popular press:

Literacy and numeracy are on the agenda [at DET principals' meetings]. Literacy and numeracy are number one. Whatever you hear mentioned in the press is what we [principals] talk about. But literacy and numeracy are always number one [Tra:int:21.10.08].

Additionally he attributed his prioritisation to the needs of the broader school community:

The level of what we can cover too is limited vastly by the entrance level of education of the community. If children came to school reading and writing we could start doing all these things [EfS] straight up. But the reality is most

children in [this area] don't come with that level. A vast majority of our children ... come with very poor literacy levels. Parents have very poor literacy levels and as a result that becomes the number one focus [Tra:int:21.10.08].

One inference from this statement is that Trafford understood study of the environment to be something apart from work in literacy and numeracy. A NSW DET study (Munns et al., 2006) identified many schools as being familiar with the problem of trying to improve student outcomes to levels comparable to more advantaged areas. Munns' (2006) study demonstrated that where teachers focus on student engagement, including engagement in the local environment, improved learning outcomes ensue. Student engagement in schooling can be greatly enhanced through active learning in places in children's outside-of-the-classroom environment (Malone, 2008). The point being made is that to view the environment as an 'add on' to 'real' school learning may be to overlook a powerful tool for enhancing learning performance.

Trafford, when asked if he could identify any interest in environment from Trudy, acknowledged his awareness of her desire to build a garden, but stated that he had made his views clear to her in the following manner:

It's her first year and I took Trudy aside and said 'Get your practice under control, get the nuts and bolts ready first' [Tra:int:21.10.08].

Trafford bemoaned the fact that beginning teachers came to the school from university, lacking in the fundamental skills of teaching literacy and numeracy:

And every single school has to spend enormous sums of money in training teachers when they first come into the system and they also have to spend an enormous amount in giving them the basic skills and they rely heavily on experienced teachers to take that work load [Tra:int:21.10.08].

In his view, teacher education should focus far more on the practical skills of teaching literacy and he defended his argument by stating that the programming skills required to incorporate EfS into teaching were less challenging and therefore of lower priority:

If they [our pre-service teachers] learn the skills of how to teach phonics properly, how to do running records, how to teach reading, how to teach writing, all those things, they learn those skills and they come out prepared. The integration part's not that hard [Tra:int:21.10.08].

Of course literacy teaching skills are important. However it has been reported elsewhere that integration across the commonly conceived disciplinary boundaries is 'hard' (Applebee, Burroughs & Cruz, 2000) therefore suggesting that, in the interests

of EfS, program integration is a skill that should be addressed in pre-service teacher education and supported through the school's stage teaching teams.

Other staff members were well aware of Trafford's priorities, making remarks such as the following from Juanita, Trudy's supervisor: 'This year our focus has been literacy. We have really pushed it' [Ju:int:22.10.08]. Mungo, who had taught at the school for twenty years, identified the focus on literacy and numeracy as a shift in school culture:

Over the years the school has been big on performing arts, dance in particular. Sport was always important. They were the main areas that children enjoyed about coming to school, taking part in those things. Over recent years it's been more on back to the basics of academic literacy and numeracy.

Interviewer: What drives that?

Mungo: Oh basic skills. DET. And that's driven with the new principal. Of course there's a lot of feedback. How are we performing? How are we compared to the scales?

Interviewer: What do you think of the basic skills tests and the comparison between schools?

Mungo: Well it's occurring. They said that it wouldn't but it does happen. It puts pressure on, particularly the executive of the school and then of course it's refocused [on us]. The community read about it when it goes to the media. We're obviously media driven [Mu:int:21.10.08].

Mungo's account of why literacy and numeracy teaching were emphasised is consistent with the explanation offered by the principal, Trafford. Mungo also perceived that Trafford was instituting the view of the state government as expressed through the DET. The DET of course, also have the *Environmental Education Policy for Schools*, (2001a), implementation which is mandatory in schools:

Mungo: It's [EfS] supported by the DET. Though it depends, I don't know how much [Mu:int:21.10.08].

The prioritisation of literacy and numeracy, and the absence of any direction in relation to environmental education on the part of the principal left Mungo somewhat bemused as to the sincerity of the DET regarding EfS.

The principal held EfS in low regard. In his view, EfS was not a focus of the school, even though it was evident that particular teachers ran environment related programs. Mungo and Madge for example conducted the gardening activity wherein Mungo's

Year 6 students worked with Madge's Year 1 students on outdoor garden activities.

However, the principal trivialised this scheme in the following manner:

Mungo and Madge are using their kids to work on the grounds and improve it and that's a Friday afternoon thing and that's a low point in the week. And the reason they do that is because half of the children are out at sport and half are back here at school. And that provides the children back here with a focus and some purpose for that time. They're kids who didn't make the team [Tra:int:21.10.08].

Similarly, the principal spoke about the recycling scheme as though its learning potential was inconsequential:

I don't think you would call it [the recycling scheme] a concern, a culture of the school. We do those small things. The children report back at assembly each week. The SRC report back but as much as anything it's about saving money. So the bin doesn't fill up as quick. I s'pose you'd call it a whole school thing but it's not a major focus. Like all teachers take on responsibility around the school and Mungo does the SRC. And SRC drives that environmental concern. But we don't deal with it as a topic. As such we don't make it a major factor. Literacy and numeracy. And that's what I'm being judged on [Tra:int:21.10.08].

Mungo however acted from a deep concern for the unsustainable nature of contemporary living and operated on this to the point where, in the absence of a complete service for pickup of school recyclables:

I actually take the plastic and glass recyclables home. And put it in my council waste. It's easier. Only on principle. You've got to be seen to be doing it [Mu:int:21.10.08].

Just as the principal chose to understate the environmental and social learning associated with gardening and recycling activities in the school, he also, when directly asked to state the names of teachers undertaking environmental work, failed to mention the work of Warwick. Warwick was a strong advocate of the environment with exceptional skills in teaching drama. For five years Warwick had organised his Stage 2 or 3 students to create prize winning films, all of which had a pro-environmental message, raising awareness of current issues such as climate change and over-consumption. Whilst Warwick's work was a part of the diverse school culture that, in Mungo's view, typified the culture of the school in the past, for Trafford it seemed to be of little consequence.

There were strong expectations from Trudy's supervisor, Juanita: 'They [beginning teachers] have got to be able to work as part of a team' [Ju:int:22.10.08]. According to Juanita, the team approach brought with it particular advantages of social cohesiveness:

Interviewer: If you wanted to run any environmental programs in the school what do you see as facilitating that?

Juanita: I think here, we're very lucky. If anyone wants to take something on, everyone supports them 100%. I've been in schools where that just doesn't happen. So I think we're pretty lucky that way [Ju:int:22.10.08].

This level of support could be advantageous to a new teacher. Strong collegiality amongst teachers and a strong team culture can contribute substantially to the enculturation of novice teachers and to student learning (Panizzon, Barnes & Pegg, 2007). Trudy appreciated the assistance of her supervisor, but when Juanita was asked: 'What do you identify as environmental projects in this school?' she answered, 'At the moment we don't have any' [Ju:int:22.10.08]. Given that Juanita did not acknowledge existing projects, it is just possible, that the very cohesiveness described by Juanita, might operate to exclude environment-related teaching on behalf of the beginning teacher, simply because the team focus was elsewhere and environment not on the agenda.

In contrast, several teachers remarked that the children in the school enjoyed environmental activities. An example comes from Stage 1 teacher Madge who engaged the children in garden making:

The plants that we've put in have stayed and the kids feel proud about it. They say 'Oh I did that' or 'How's our garden going?' [Ma:int:23.10.08].

The interest of children in any particular topic or activity is always encouraging for teachers and evidence of their engagement with the life of the school (Hargreaves, 1998). However Madge and others perceived the parents as having a different view of the environment:

Interviewer: Expectations of parents: what are they in regard to environment?

Madge: I don't think the parents give two hoots about it [Ma:int:23.10.08].

Madge's remark echoed those of Trudy and Trafford: that people in the wider community held little interest in matters of the environment, and this would have implications for their expectations of the school.

Paddy was employed several days a week to maintain the school grounds and buildings. He was keen to develop a new native garden. Paddy helped Trudy with information and equipment. He understood that garden work by the children had educational purpose and was part of the curriculum [Pa:int:22.10.08].

The understanding of EfS, held by the particular teachers with whom Trudy interacted provides insight into the context within which she worked. Table 6.1 provides statements suggesting how each person with whom Trudy most closely interacted interpreted EfS. Warwick gave a comprehensive response that included reference to critical thinking, an explanation of why action in the environment is necessary and why values and motivation to act are essential elements of EfS. Trafford was dismissive as discussed above, and Trudy's supervisor Juanita was unaware of the term. Madge understood the role of values and thinking of the future, and Mungo saw the need for teaching action skills. None of the remaining seven teachers, Trudy aside, were identified by Trudy or those quoted in the table as having an interest in environment. However it seems there was great potential in this school for a sustainability focus to become established. Although Juanita felt she had no skills in EfS, she was not opposed to it, and the interests and skills of individual teachers such as Mungo, Warwick, Madge and Trudy were apparent. Lacking was a catalyst and willingness in the school's organisational hierarchy to make EfS a part of whole school culture.

In summary, Trudy appears to have entered a context within which EfS was not regarded as a characteristic of school culture and not considered particularly important except to individuals who took it upon themselves to act upon their environment-related interests and beliefs. The environmental work of these exceptional individuals was not championed or celebrated in the school. The school culture was one where the beginning teacher was strongly supported in a professional and social way, but where there was no expectation that EfS need be pursued. The following section outlines the attitudes to EfS that Trudy expressed as a pre-service teacher and which, it is assumed, she brought to the school as a beginning teacher.

Table 6.1: Teacher responses made to ‘What does the term “Education for Sustainability” mean for you?’ (N=5).

Teacher	Individuals’ responses to the question: ‘What does the term “Education for Sustainability” mean for you?’
Madge, Stage 1 teacher	How to keep things going on without using too many of the limited resources we have available. It teaches the children how to make the best use of any resource that we have [Ma:int:23.10.08].
Juanita, Trudy’s immediate supervisor	What do you mean by that? I think you can link environmental work into other areas but to do that you have to have the knowledge yourself. We [the Stage 1 team] would all have to have as much understanding as Trudy of what’s happening and how it all works for everyone to be able bring that into their literacy lessons [Ju:int:22.10.08].
Mungo, Stage 3 teacher and SRC manager	Sustainability. Basically educating children that we don’t use all our finite resources up and then find we have nothing. So we basically have to be returning and reusing, recycling. Basically we’re educating children that we can’t be in a throw-away society. We’ve all grown up in a throw-away society but it can’t go on forever [Mu:int:21.10.08].
The principal, Trafford	I think mostly it [EfS] ties in with HSIE and maybe a bit of science but outside that it doesn’t. There’s been lots of initiatives over the years like Sustainable Schools but generally in all of the schools I’ve previously worked in it’s been viewed as an add on that you just do. It’s a one off event. You go to the environment centre or wherever [Tra:int:21.10.08].
Warwick	‘What can we do about global warming?’ They [the children] found out that global warming was caused by such things as emissions from factories and cars. And they were saying, ‘Stop driving cars, shut down all the factories’. All these things that can’t be done. So OK, what would happen if that were the case? ... That was an example of critical thinking ... ‘And what would happen if there were no cars? People couldn’t get around ... And what are you going to do about it? You’re 10 years old, what can YOU do?’ And they had to reflect on their learning, reflect on the outcomes they’d drawn, reflect on the unreasonableness of it. And yet we want to avoid this sense of helplessness right? ‘Because you CAN do something ... What is something you can go home and do today ... It’s also that sense of empowerment too ... You have to bring it down to a level where ‘You can do something and you can do it now’[Wa:int:23.10.08].

6.5 Trudy's views of EfS as a pre-service teacher

At the completion of pre-service teacher course work (T2) and before professional internship Trudy expressed strong intentions to include EfS in her future teaching. She attributed her intentions to her love of the natural environment established through childhood experiences outdoors and parental interests, as well as to disturbing overseas observations of environmental degradation and poverty. She valued her childhood experiences in the natural environment and believed that all children should have similar opportunities 'to be aware of how important and beautiful [the natural environment] is' because 'it could be lost through ignorance or disrespect' [Tr:int:T2]. She believed that children should have opportunity to see 'how lucky they are' and that education should 'allow them to give something back [to the environment]' [Tr:int:T2].

At the completion of her pre-service studies, Trudy's conception of EfS included acknowledgement of the potential for curriculum integration:

Trudy: It's an umbrella that spreads across so many different areas. It can be woven throughout the whole curriculum and it makes it a lot easier to be able to put it into everyday activities and provide for all the different children's interests. So you're doing environmental education for sustainability through art for example, which might invoke enthusiasm in a particular student. So I'm very conscious that the other areas of primary education will allow me to do it [EfS] every single day in a different way [Tr:int:T2].

She understood that there was a chain of events that connected everyday individual actions to environmental degradation at local and global levels ('to realise that we have actually created a lot of that emptiness and barrenness' [Tr:int:T2]) and that there were strategies for helping children to comprehend the connections. She was conscious of the need for 'good news' stories in EfS [Tr:int:T2], as well as of investigations into environmental problems. She recognised the potential of pedagogical planning models such as that proposed by Jensen (2002) and was intrigued by the notion of a whole school approach to sustainability:

Trudy: I never considered a whole school approach as in changing the culture, like with the environmental audits. I never really considered that. I didn't think you could change a *school*. You'd have to change so many minds. It would be an interesting concept to see if I could do that [Tr:int:T2].

Trudy indicated in both pre-service written surveys [Tr:SurvA(T1) and SurvB:(T2)] that she ‘strongly believed’ that teachers could play an important role in solving environmental problems through teaching. Her motivation to include EfS in her teaching was ‘very strong’ because EfS ‘will allow children to grow up actively thinking about their impact on the environment and their future’ [Tr:SurvA]. Trudy believed: ‘You can have an effect [as a teacher] because you just change your little part of the world’ [Tr:int:T2].

Survey at T2 showed Trudy felt ‘very confident’ to include EfS in her teaching:

My confidence has been enhanced throughout the unit as I have been exposed to a variety of successful teaching strategies for environmental sustainability. Teaching strategies are the key! [Tr:Surv:B]

However, high levels of confidence may not apply across the board (Tschannen-Moran & Hoy, 2001). In interview at T2, Trudy expressed some reservations with regard to her confidence in particular aspects of EfS. She considered that it was ‘extremely important’ for students to critically analyse the values underlying everyday unsustainable behaviour, but as a pre-service teacher she did not feel that she had a good grasp of the strategies that would help her to do this with children [Tr:int:T2].

Furthermore, although she expressed a strong motivation to engage with EfS and confidence in her ability to do so, she had one other reservation. When asked what it was that would diminish her motivation to include EfS, she responded with a concern:

I think I would find it challenging if no one else was doing this work. I’d be quite willing to go on but I think I would find it challenging if the children or the community or the other teaching staff weren’t interested [Tr:int:T2].

In making this statement, Trudy showed that she sensed the enormity of the task of EfS, and was making the realistic assumption that not everybody would be as interested as she herself was. Trudy’s remark about the potential influence of others in the school on her capacity to engage with EfS is well founded, as research illustrates that beginning teacher perceptions of school culture have an impact on their teaching decisions (Flores & Day, 2005). Many of the ideas about EfS (such as integration of EfS into curriculum and the whole school approach) were introduced to Trudy during EDSE 412. She admitted that the notion of including EfS in her teaching had not occurred to her before the unit:

Trudy: Most things [in EfS] I hadn't considered. Sustainability is one. I knew that there would be certain structures for example, Clean Up Australia Day. That would be a whole school activity, but I never considered a whole school approach as in changing the culture of the school like starting with the audit [Tr:int:T2].

However having undertaken EDSE 412 and having become aware that EfS was part of the role expected of her as a teacher, she was able to anticipate a future where she included EfS. The university unit legitimised her own existing concerns and desire for a more sustainable world.

6.6 Trudy's perspective: personal motivation

Trudy maintained that during this first teaching year she experienced increased motivation to incorporate EfS into her teaching, partly in response to her observations of the urban environment to which she had moved:

It's not a huge part of the school curriculum in a lot of the schools I've heard about in this district. It's not a priority. And I think that's sad. I think it should be more of a priority because there's such a density of people and there are so many consequences to the environment because of people's actions in this one little area. There are so many people, there's so much transport ... And I think that the children who live in these areas may not have the room to have compost bins or gardens or anything. I think it's important for them to at least have knowledge of it. And if I can provide them with an area where they can do these things then maybe they'll take that to wherever they go after this. So I think it's more of a motivation because I can see it's lacking in a way. Not because of the individual schools but because of the lives that they lead [Tr:int:20.10.08].

This view resonates with Trudy's statements recorded whilst she was in her final pre-service year, wherein she identified social factors as precipitating a need for education in relation to environment. At that time (T2) she felt strongly motivated to include EfS in her future work, partly, as mentioned, because of the values of her home, but also because of experiences where she recognised disadvantage as a factor exacerbating visible environmental damage and education as a having a critical role in change. Here at Rosewood Gully she recognised a disconnection between children's lives and the natural environment and an acute need for children to understand these connections in a highly altered urban location.

Trudy had been deeply appreciative of and inspired by the EfS that she saw in operation at her internship school. When asked whether she felt more or less

motivated to include EfS in her teaching now, compared with whilst still at university, she replied:

I think I'd have to say more motivated, if anything because I've seen, particularly from my internship last year, how well it can work in a school. We used to have a recycling bin at Wattle Flat and the food scraps used to go in the compost bin. And so I thought, well maybe I can get them started on doing that. So that was the next step. I think that my internship consolidated that because it was more practical in a way [Tr:int:19.10.08].

Whilst her appreciation is likely to have stemmed from her pre-existing environmental views, it may also be attributable to the fact that at Wattle Flat she participated in a practical and successful application of EfS consistent with notions presented in EDSE 412.

6.7 Trudy's perspective: school culture

Trudy interpreted the culture of the school as generally favourable in the sense of enabling her to proceed with EfS. She regarded the environmental outlook of several individuals as encouraging and her perceptions correspond with remarks made by those people. In particular she regarded Mungo as an ally in environmental work:

He's a lovely man. Every time I go walking and I see rubbish I'm reminded of Mungo. He says that if ever he drops a piece of rubbish, or something blows off his truck, he has to stop and go pick up ten pieces of litter [Tr:int:20.10.08].

Mungo was a role model for Trudy in EfS, caring for the environment in an energetic and practical way and confident in what he was doing. He was happy to talk about his concern for the environment, and gave approval and encouragement to Trudy in her environmental efforts.

In addition to the support of Mungo, Trudy identified curiosity in environmental work amongst the staff:

I know that they are interested in it from discussions we've had. In second term I started asking Mungo if we could get a garden up and running because there is an area near the staffroom that used to be a garden. And I asked whether we could do that. And I know Year 1 and Year 6 weed that. I've had a few teachers ask me what I'm doing with the compost bin. We had one donated to the school [Tr:int:20.10.08].

Unsolicited, teachers in the school had handed her teaching materials related to environmental work, suggesting that they identified Trudy's interest and that they wished to be helpful.

In addition to Mungo, she identified Paddy and Madge (Year 1 teacher) as her greatest allies in environmental work:

Paddy does the gardening and the lawns. He's been extremely supportive as well. Thursday we're going to have a meeting with Trafford about the garden. He'll put the figures together if I put the curriculum together. We'll draw it up and present it and I think he's got the children's interests at heart as well ... he made the comment that it should be appropriate for curriculum outcomes for the children. Not just doing something for the school, it's for the children ... the rest of Stage 1 help me organise, how to timetable, give me advice of how to fit it in, or give me ideas of what I can use around the school that may be here and that I may not already be aware of. For example Madge is always telling me of facilities that we actually have [Tr:int:20.10.08].

With regard to the principal, Trudy made positive general remarks, commenting that he was approachable, would listen to her ideas and that he trusted her professional intentions [Tr:int:20.10.08]. Her attitude towards the principal is confirmed by the fact that, with Paddy as her ally, she was prepared to approach him with plans for a garden. She knew that such a proposal would need to be substantiated with curriculum links and garden measurements but despite his apparent disinterest in EfS she felt that she could proceed.

The children in Trudy's class responded with enthusiasm to environment-related initiatives that Trudy had introduced into her classroom routine:

I think the other thing too that I haven't had a lot of opportunity to do in my past teaching is finding the things that interest the kids. I know particularly that by this point in the year, because we have had such a big push on things like literacy and maths, they're loving what we're doing at the moment in science because it's hands on, it's practical. They really enjoy that. So I think I really enjoy finding what they like and moulding my units around that. And I've seen my units change because they have become really interested in something [Tr:int:21.10.08].

This enthusiastic response from the children encouraged Trudy to continue with an environment focus in her teaching. Positive student response is known to be encouraging to teachers (Hargreaves, 1998), and as an example, Skamp (2009)

reported that student feedback on learnscaping activities was influential on continued teacher use of the learnscape.

6.8 How did Trudy respond in this context and why?

Trudy engaged with EfS in several ways. Classroom observation and her reflective remarks show that she began by establishing routines for the children for more sustainable ways of operating within the classroom [Tr:int:19.10.08]. Lesson plans and classroom observation showed that she integrated positive values and relevant knowledge into her science and literacy program for Year 2. Class observation showed that she provided strong support for the school recycling system through reminding children to use the recycling system and explaining how to use it correctly. Lastly class observation and her teaching program showed that she was implementing a specific teaching unit based on waste reduction and recycling. Trudy had an environmental agenda. Her explanation for her strategically chosen actions follows.

Whilst Trudy engaged in environment related teaching, she saw her fundamental role, as teacher, to be the teaching of literacy and numeracy:

Trudy: I think that literacy plays a huge part in understanding a lot of KLAs not just English. It's a key to mathematics, to science. But I also think that one of the main parts of teaching is to work out what foundation blocks you can provide them so that they build on them as the year goes on and more independently. So I think the most important things in teaching are providing them with those fundamentals, in particular English because there is a huge gap there, not as big as I've seen in other schools but it's still a contributing factor to how well the school performs and how well the children are going to pick up in other areas like science, like mathematics [Tr:int:22.10.08].

Trudy understood that the basic skills of literacy and numeracy for her Stage 1 children were 'keys' to other learning, essential for their progress into later stages at school, and therefore demanded a priority on teaching time. In this she was in agreement with the strongly advocated priorities of the principal, her supervisor and the NSW DET. However, one way that she drew in other interests was by integrating environmental work into her literacy program. Examination of children's work and of resources in her classroom revealed that she opportunistically chose environment-related reading materials and writing tasks that engaged children's interest and added

to their knowledge of environment. For Trudy, environmental matters were not an 'add-on' but rather an integral component of her teaching program.

At the end of her first teaching year, Trudy introduced to her class a teaching unit with a specific environmental focus in order to add to their experience and understanding. She chose to focus the unit on waste issues, thereby deepening the children's understanding of the significance of waste sorting routines and the Year 6 recycling program:

This term I really like the idea of composting because a lot of my children are not in the position where they could have a compost bin in their house. So I like the idea of having it at school because it's a place where they can experience that [Tr:int:19.10.08].

Lesson observation showed that through the waste reduction unit she was assisting children to identify problematic human behaviour at the level of the individual; helping children to identify and act upon more sustainable ways of doing things (at the level of individual and collective whole class behaviours); encouraging children to act more sustainably through a reward system; and incorporating curriculum work that assisted children to gain preliminary understanding of human impacts, of decomposition and of more sustainable ways of living. A portion of this learning was organised such that children were active in the sense of going beyond the skills of investigating and describing the waste problem to doing something about it. Trudy was explicitly implementing the NSW DET *Policy* (2001a) and, aside from the use of a reward system, incorporating basic elements of Jensen's (2002) model of action competence, albeit modified to the abilities of these very young children.

Trudy was unable to teach the waste reduction unit until the end of the year, after she had completed other work as required in the stage team plans. However prior to this, she found other ways of implementing her environmental agenda:

Trudy: I think from what I have learnt this year I would start off with the little things that would become routine. I've found that to be most useful at this point: just introducing them to the concept because there was not a lot [pause] of active awareness I suppose. I think the small things have really helped in building up to what we're going to do this term. So things like having a monitor who turns off lights when we leave the room. Having a method of washing our hands after art so that the tap's not going the whole time [Tr:int:19.10.08].

Interviewer: So you're saying that you really just start by organising the children for good practice?

Trudy: Yes [Tr:int:21.10.08].

As part of this approach, Trudy trialled a reward for positive actions called a 'point scheme' provided by the Keep Australia Beautiful Council (KABC) and the children enjoyed it:

I really wanted to do this point system because they loved it, because they got a point every time they turned the light off. And so I wanted to do that again this term [Tr:int:21.10.08].

She believed that her first priority was to encourage the Year 1 children in the conservation of water and energy and to establish routines for them to recycle paper and later to separate out food scraps from their lunch waste. These routines, reinforced using the KABC 'point scheme', fell short of the critical thinking believed by many to be vital in EfS (Gough, 1997; Bonnett & Williams, 1998; Fien, 1999/2000; Flier, 2002; Fien, 2003; Bader, 2004; Robottom, 2004; Ernst & Monroe, 2006; Blanchet-Cohen, 2008; Greenwood, 2008). Rather it coincided with the introduction and rewarding of pro-environmental behaviours regarding the conservation of resources (Kollmuss & Agyeman, 2002; Heimlich & Ardoin, 2008). As with participation in the Year 6 recycling scheme, this was an example of ESD 1 as described by Vare and Scott (2007); guiding positive actions through incentives to produce immediate results that could be measured as reduced environmental impact.

Trudy had assessed the situation, finding that children were lacking in awareness and experience of environmental matters. From there she used her professional judgment to consciously make teaching choices suited to her young children. Her choice was to begin with simple actions in which the children could participate and from which they could feel pride in achievement. Her strategy was to then develop concepts on the basis of the children's experience.

Additionally, Trudy actively supported existing (albeit uncelebrated) 'whole school' programs at Rosewood Gully, specifically recycling and litter control, and ascribed them far greater importance than did her principal. Having a pre-existing concept of

Table 6.2 Coherence of Trudy’s actions with Tilbury’s definition of EfS

The definition of EfS used in this column is adapted from Tilbury (1995).	Trudy’s actions
EfS has relevance in that it deals with contemporary issues of concern to learners who are encouraged to explore links between their personal lives and wider environmental and social concerns.	Trudy encouraged students to explore links between personal behaviour, waste management, water use and environment. An example was teaching surrounding waste sorting and compost making.
EfS has an holistic curriculum base in addressing environmental issues and in teaching and learning, identifying the whole picture surrounding an issue.	Trudy prepared a unit of work which developed understandings of environmental links through English and science.
EfS not only teaches about values but also teaches values, in this case ‘an environmental ethic which has sustainable living at its core’; highlighting ‘the importance of valuing the interrelatedness of the web of life and promot[ing] the principal value of concern for all life forms’ (Tilbury, 1995:201).	Trudy taught values such as interest in, and care for environment through her ‘Caring for the Environment’ unit, through her reading program and through classroom routines.
EfS is issues-based wherein students ‘consider matters of fact, values and morality’, to allow for an ‘exploration of moral, social and political values required for the development of an environmental ethic’ (Tilbury,1995:202).	Trudy’s teaching unit surrounding children’s waste management examined facts; required children to identify ‘correct’ and ‘incorrect’ behaviours in the environment; and actively engaged them in processes of recycling and care.
EfS is action-oriented, both in encouraging learners to personally and collectively take actions towards sustainability, and in promoting the use of active teaching and learning strategies.	An example of this is Trudy’s use of strategies such as holding a zero waste lunch day, compost making and establishing routines such as waste recycling.
EfS involves critical education, that is, an education that develops socially critical and political literacy skills, necessary because of the social complexity of environmental issues.	In Trudy’s environment unit children were asked to compare pristine and altered environments and to consider the consequences of their actions in the school environment. These activities represented initial steps in critical thinking at Year 2 level.

‘whole school’ practices for sustainability from university work, and having experienced this approach at Wattle Flat, she was alert to the significance of such programs and she would therefore be more likely as a teacher to support, rather than overlook them or provide only tokenistic support. She described Mungo’s Stage 3 recycling project, where students were given opportunity to exercise initiative and responsibility as a ‘leadership program’, as illustrating elements of contemporary

ideas about EfS, for example, the need for independent student responsibility and collective action. Table 6.2 shows that Trudy was making considerable effort to engage with EfS and these actions are set against the Tilbury (1995) definition of EfS provided in Chapter 2.

Overall Trudy was requiring children not only to engage in actions that would reduce waste, but also to think about the waste problem so that the actions would be meaningful to them. Additionally, positive environmental values were demonstrated and encouraged. To hold a zero waste lunch day is in fact to express a criticism of the common high-waste, packed school lunch. However there is no evidence to suggest whether or not children felt prompted or empowered to make changes in their lives beyond school, on the basis of a developing sustainability ethic but perhaps this would be beyond Stage 1 children in any case.

6.9 What enabled and what constrained Trudy's environment related teaching?

Trudy felt supported in her environment-related teaching by the encouragement and assistance of particular individuals (e.g. Mungo and Madge) and by staff who were warm and accepting of her as a new teacher in the school and by the physical facilities of the school. However, it is likely that Trudy perceived the school culture as not as conducive to EfS as it had been at Wattle Flat School. When asked at Rosewood Gully how confident she felt to incorporate EfS into her teaching, she replied:

I think it has a lot to do with the setting. When I was on my internship last year I felt very confident in including it because I knew that over the entire school it was a priority, especially for the principal and for the school. Because they were entering the Little Legends competition and they were state winners last year. So I felt quite comfortable teaching it and including it because I knew that it would be well received [Tr:int:21.10.08].

In contrast, her approach at Rosewood Gully was cautious. She took 'small steps' with her class, gathered support from interested others, and, before proceeding to establish a compost bin in the school yard, sought approval from the principal. Even though at Rosewood Gully her approach was cautious, when asked, Trudy had claimed to be more motivated to engage with EfS than she had been as pre-service teacher. It would appear that at Rosewood Gully, whilst her motivation to including EfS was strong, she felt constrained in her actions by the overriding 'other agenda' of the school and this was in direct contrast to the way she felt at Wattle Flat.

The fact that Trudy's short unit on waste reduction was postponed until the end of the year when her obligations to adhere to the planned sequence of teaching units for Stage 1 had been attended to establishes that her EfS efforts were constrained. Her perception of the school's inflexibility of curriculum organisation and absence of EfS in the goals of the school appeared to be inhibiting factors. Her everyday solution was to integrate her environmental values into the way she managed her classroom and to implement other environment work incidentally such as in her reading program.

Flores and Day (2005) reported that, in their study of first year teachers, some overcame their initial concerns with student control and an associated use of teacher-centred and task oriented work. Those who did so were able to move beyond this reaction to their need to gain control, and to subsequently respond to diverse student learning needs and abilities. Similarly Trudy was able to think about the needs of the children in her care such that her programming choices were influenced by the broader context of the school in particular the needs of ESL children:

I think a lot of it does come down to priority and need and at this point their need is to be included within a community because they no longer have their community of origin. I think it's purely survival for a lot of them and a lot of these things [environmental matters] won't matter until later on in life. That's why I hope that the little things that I'm teaching will end up just as something they'll do automatically, where it doesn't infringe on the fact that they have a lot of other stuff do deal with when they get home. At the moment the main need for a lot of these kids is to be able to speak English fluently or understand what we're saying or what the worksheets are saying or what the tests are going to say in the basic skills test [Tr:int:21.10.08].

Under these circumstances it would be easy for Trudy to simply overlook EfS. Implementation of EfS is compulsory in NSW schools but is none-the-less often ignored by schools and teachers (Tilbury, Coleman & Garlick, 2005). Trudy however found ways of incorporating EfS into her work that the children enjoyed. The principal was encouraging her to reflect on basic teaching competencies, but her remarks about curriculum and the needs of children in this particular community show that much of her thinking was about more than her personal performance in managing lessons, focusing in addition on student learning and extending to broader educational issues (Furlong & Maynard, 1995 cited in Frid, Redden & Reading, 1998). In these ways Trudy's teaching decisions were shaped by more than centrally determined state

curriculum, Stage 1 programming requirements and the priorities and expectations of the school. Trudy had the ability even at this early stage of her career, to take into account the special needs of her children, and her own view of what knowledge is of most worth.

Whilst she demonstrated her willingness to engage with EfS, Trudy felt hampered:

So I think maybe my knowledge is a limitation. I know that that will improve over time as I become more experienced in it. And teach it or practice more with children.

I think that I've got a passion for EfS and I think that I'm very interested in it and I've learnt a lot particularly over the last year with my experiences. But I have not had a lot of experience in the garden. I find that perspective of things a bit challenging. I have to read a lot before I try to attempt a bird friendly garden. I don't know much about plants, the scientific elements of those things [Tr:int:22.10.08]

Here Trudy is reaffirming her interest in EfS, but expressing wavering confidence on the basis of a feeling of inadequate knowledge. This is exactly the situation reported by Miles, Harrison and Cutter-Mackenzie (2006). The implication of this is that teacher education should include opportunities for students to acquire EfS related knowledge and understanding and this supports Grossman's (1990) recommendations for teacher education. With greater knowledge, Trudy would feel more confident and therefore more likely to integrate EfS into her teaching.

From her statements above it appears that Trudy had identified challenges to engaging with EfS originating not so much from the physical nature of the school or from its culture, but rather from what she identified as personal shortcomings. As a pre-service teacher she felt confident that she could include EfS on the basis of the resources and skills that the university unit had provided. In the event, as a teacher, she demonstrated strong determination to engage with EfS but with this she identified shortcomings in her knowledge. She none-the-less expressed confidence in her capacity to overcome those personal challenges with experience and effort on her own part.

The analysis to this point portrays a beginning teacher who expressed a strong desire to incorporate EfS into her teaching, who found opportunities to do so, but who also

appeared to be constrained in several ways. She built her capacity to include EfS by identifying and approaching individuals in the school who could assist her; identifying environment related projects in the school with which she could assist; improving her own skills through reading and through discussion with others; and reviewing her university work in EfS as discussed below. However, from interviews with others in the school, it appears that she may have been constrained from including EfS in her teaching by a school culture, strongly influenced by the principal, that prioritised literacy and numeracy to the exclusion of EfS. Furthermore, there was a perceived lack of interest in the environment on behalf of the wider school community; a stage teaching team organisation that provided a scope and sequence of teaching content that was to be taught by the beginning teacher and that did not acknowledge EfS; some sense of personal inadequacy in terms of experience in EfS pedagogy and knowledge of science; and identifiable shortcomings in the university EfS unit, which for Trudy could have given greater emphasis to particular subject matter knowledge. Whilst most of the constraining factors are beyond the immediate control of either the beginning teacher or the teacher education provider, Trudy's inventive strategies for augmenting EfS capacity for herself and for the school could advantageously be communicated to pre-service teachers for consideration.

6.10 Links between what Trudy did and aspired to do and teacher preparation

As a beginning teacher, Trudy acknowledged the effect of raised awareness of environmental issues from EDSE 412: 'It had an impact when you learnt the statistics' [Tr:int:20.10.08] and perceived the connection between broad environmental issues and the immediate environment around her. She recognised also the centrality of action in learning for sustainability:

I enjoyed being able to learn about the theory but then also going out and doing things to improve sustainability. And doing investigations, it was something that was really fun and practical' [Tr:int:20.10.08].

As a graduate with a strong history and literacy background but little science, Trudy found the practical work associated with the EfS unit to be novel and enjoyable. Her teaching showed that her understanding of EfS included action for the environment as had been suggested in EDSE 412. Thinking critically about the impact of cultural values on environment was encouraged in EDSE 412, but instances of engaging children in critical thinking as Warwick did, were not observed in Trudy's classroom.

As Warwick suggested however, it is likely that it would be challenging to engage Stage 1 children with critical analysis of issues on the basis of their young age and inexperience [Wa:int:23.10.08].

Trudy explained that in her experience as a school student, EfS had not been a focus of learning. Rather learning had been organised according to subject areas. Further she had not experienced sustainability as something intentionally practised in her schools:

But it [EfS] was something that I really hadn't thought of doing because I wasn't given a book on it when I was at school. You had your HSIE book and you had your science book and you probably did things like it in science like pollution or whatever but as an actual focus and something becoming ingrained in practice, it wasn't done [Tr:int:19.10.08].

Those possibilities arose during EDSE 412 such that as beginning teacher, she understood the notion of integrating EfS into curriculum:

It [EfS] doesn't have a syllabus. It sort of comes under the umbrella of all the KLAs. It can be integrated in a lot of things [Tr:int:19.10.08].

By the end of her university studies, Trudy maintained that she understood and appreciated the processes and advantages of programming in an integrated way.

Trudy remarked that she believed her science skills to be inadequate:

When you try to explain something to children you really need to have a good knowledge of the science behind it. And even though you think that you do, you really don't. You might be able to explain it. You might have knowledge that you're happy with yourself. But when the children ask 'why', although you can go and research it together, I really think you need those fundamental science principles behind you [Tr:int:19.10.08].

Apart from provision during teacher education, Trudy had not participated in formal science classes since junior secondary school. This situation was common within the cohort of pre-service primary teachers. This suggests that if teachers are to engage primary children in environment-related science activities, by the completion of their pre-service education they should have the conceptual scientific knowledge necessary to do so, or at least the confidence to remedy any shortfall in their personal expertise.

Trudy felt confident in her ability to teach certain aspects of EfS that had been presented during EDSE 412 and this confidence stemmed from knowledge of both theory and practice:

I think I'd be confident to carry out an audit because I've got the theoretical idea plus the practical that I learnt. I'd be confident in building a garden because I saw Annie do that, and that garden outside the block, it had so many native plants in it that I have some idea of what it should look like.

We did practical things. We built the gardens. We had children come in from Puddledock School and we taught them. That was a big learning curve for me as well.

You know that assignment we did where we had to go out and I did the garden with my niece and nephew. I found that really interesting just because I didn't know how it was going to turn out and I'm not a gardener and I had no idea, but with the lesson plan behind me, I would be quite happy to do that in school [Tr:int:19.10.08].

These remarks reinforce the notion that practical experience with strategies that can be implemented in schools is important in pre-service teacher education (Shepardson & Harbor, 2004).

In addition to gaining a conception of EfS and its associated pedagogy Trudy appreciated opportunities given to pre-service teachers to develop lesson plans:

I think the lesson plans were a big thing for me because I have them all stored away. And even if they're not exactly the same, I would like to use that lesson one day. Change it so it fits the current situation and the current demographic.

I think the lesson plans meant a lot because it was something I had there as a resource, or were something I had done or I had practised [Tr:int:19.10.08].

Indeed all of the practical teaching activities that had been suggested within EDSE 412 were particularly valued:

I know that when I finished university I went through all my folders and I had a mountain of notes and assignments. I really went through it with a fine toothed comb and picked out what would be useful to me in class, kept the theory that I thought would be relevant but mainly chose things like worksheets, audit outlines, or proformas, units that I'd been given or printed off. Because when it comes to programming it's just great to have those even if it's just an idea in your head of how it could run. I know that the lesson plans and the program that I did for the EfS unit were in my head when I designed this one [that I am teaching now]. I used the information that I had in the back of my head from creating those or seeing those [Tr:int:19.10.08].

The importance of the experience of putting theory into practice during internship was emphasised by Trudy:

I think that my internship consolidated that [what I learnt in the EfS unit] because it was more practical in a way. I think the garbage audits that we spoke about and watched and saw how to do it: we actually did that at Wattle Flat with things we picked up off the riverbank. So for me that consolidated my theoretical understanding. I found I consolidated a lot of that [theory] during my internship because it was hands on. I remember every Friday we went out and did Dunecare [Tr:int:19.10.08].

Trudy had been fortunate in that her internship school used a successful whole school approach to EfS. However not all internees would have had that rich experience. Actually having the opportunity to be a part of the environmental activity of the internship school had a strong impact on Trudy in that it allowed her to see theory in action but also it gave her a goal or conception of EfS to which she could aspire.

In summary, for Trudy as beginning teacher, the following links between her actions in EfS and her pre-service experiences have been identified. Apart from her own interests in EfS, her pre-service experience assisted in development of skills in integrated programming; provided confidence through modelling of practical activities and opportunities to prepare and implement lessons; and provided an internship experience which demonstrated exemplary EfS. None-the-less her belief in the inadequacy of her science skills implies that this need should be more strategically addressed in pre-service years.

As pre-service teacher, Trudy was keen but recognised the problem of many teachers in the school not being interested. In the event there was no strong culture of EfS at Rosewood Gully and EfS could easily be overlooked. However she found her allies and made a commendable effort. This case demonstrates that EDSE 412 helped firstly by bringing the legitimacy of EfS into prominence through examination of policy and authentic examples from schools, and secondly by providing resources that the beginning teacher could use to implement it.

6.11 In what ways does the beginning teacher engage with EfS and why?

This case illustrates the efforts of a beginning teacher, interested in EfS and determined through reflection and strategic planning, to include it in her work. In this

school there was a silence regarding EfS from the hierarchy of school management and the community at large. The NSW DET *Policy* (2001a) and the work of the EECs were invisible in this school. However the example of Trudy demonstrates that EfS in pre-service education was a catalyst to Trudy's efforts and implies, as Mungo stated, that if EfS is to become more commonly addressed in schools, it is essential.

Although it can be said that EfS in pre-service teacher education is essential, this case does not demonstrate that EfS in pre-service teacher education is sufficient for it to become a part of necessary culture change towards sustainability. Some see teacher education as a solution to the recognised inadequacies of EfS in schools, but this case shows that teacher education is just one (important and necessary) step in a cultural shift towards sustainability. This case also demonstrates that EfS is essential in the program of professional learning offered to practising teachers within the school, if beginning teachers are to encounter the support and role modelling they require in this area.

It would also appear that wherever school executives adopt an indifferent attitude, like Trafford, professional learning in EfS is unlikely to occur. However it may be that principals such as Trafford would respond to more sincere and forceful direction from the DET, and indeed from government, in favour of EfS. However, at the present time, DET imperatives are firmly placed with English and mathematics and this is being interpreted by the school as an imperative to a silo organisation of curriculum that need not include EfS.

Chapter 7: Andrew

7.1 Andrew at Fishington Primary

Andrew is a convivial beginning teacher, appointed to a regional urban school after having lived all his life in rural towns.

7.2 Context of the school

Fishington Primary School was established over 60 years ago. Although this is an urban area with both medium and high density housing, there is abundant open space in the district, including public parks along estuaries and creeks. Seaside climate and local facilities provide ample opportunity for outdoor recreation. This is a desirable residential area and real estate is expensive. However the school and some homes have been built in low lying areas near or adjacent to the sea and could be threatened by changes in climate and sea level as predicted for the present century.

There appears to be interest amongst the local community in environmental conservation and repair. Local volunteer groups have maintained pathways through nearby public bushland. They have worked to control weeds and provide interpretative signage. There is evidence however of vandalism and of pollutants in waterways. Local council has provided open areas for dog exercising purposes. These areas are well used and patrons appeared to be diligent about removal of pet waste. Not far from the school is an Environment Centre that was established for public education and used by the school.

Enrolled at the school were over 300 children. There were over 14 classes, K-6 with a maximum class size of 30 children. Most of the teachers were experienced with only five out of the 19 teachers having had less than five years in the profession. Many children attending this school lived in homes with backyards to play in but some lived

in high rise apartments. Only some families had difficulty in finding funds for extra trips or events for their children. There were no Indigenous students and only 20% of those enrolled used English as a second language.

The principal of the school had taken up his position just two months prior to the case study visit. Whilst the former principal endorsed and widely promoted EfS, much of the sustainable living culture of the school was attributed by members of the school community as due to the vision and diligence of one particular classroom teacher, Jan.

Under a whole school approach environmental education is ideally extended beyond curriculum to good environmental management (ADEH, 2005; Henderson & Tilbury, 2004; Scott, 2007; Tilbury & Wortman, 2005). A whole school approach to sustainability is evident at Fishington which displays considerable physical achievements with regard to improved sustainability. There are rainwater tanks, solar panels for electricity generation, and roof ventilators for cooling. Over the last decade many school communities in NSW have lobbied for cooling in classrooms that, in the past, had commonly been serviced by ceiling fans. As a result air conditioning has been installed in many schools and electricity usage has increased markedly at a time when policy makers and others are espousing reduction targets for greenhouse gas emissions. When the community requested cooling for classrooms at Fishington, a sustainable solution was sought and roof ventilators were installed instead of air conditioning. Shady gardens also improve cooling and shelter during play periods. There are native gardens, vegetable gardens, a small orchard and a poultry area. Whilst the majority of school buildings are old, the appearance of the school is inviting. A security fence surrounds the school property.

7.3 School culture

School culture reflects values and beliefs held by those working within the school and is expressed through norms in behaviour: what is expected and what is acceptable (Sergiovanni & Starratt, 1988). In the following description of school culture, particular reference will be made to environmental work including special events, the approach of key personnel and professional tasks that teachers were expected to perform. Considerable detail is provided because this school is a valuable practical

example of whole school EfS in action. Other than environmental matters, sport and academic performance were highly valued by this community.

Officially, public schools in NSW are required to produce a SEMP and Fishington was one amongst a minority that had done so at the time. Furthermore, at this school the SEMP had been reviewed after three years and a second SEMP was in progress. As a part of their science studies, students provided audit data and recommendations, for example, for water use in the school, to be included in the SEMP. The school environment committee, consisting of teachers, parents, local council and student representatives, considered these recommendations. Every member of the school had opportunity to comment on the SEMP because it was provided to all teachers who were to interpret the SEMP in an appropriate manner with their class group. Teachers were to explain actions relevant to their particular age group, to take the children's comments and to write them on to the SEMP. Those comments were then returned to the smaller environment committee [Jan:int:6.8.08]. The revised plan was put on public display in the school, with all members of the school community invited to comment. In this way, the school's activities and goals in relation to EfS were intended to be both consultative and public.

Careful plans were made to foster sustainability as a significant part of school culture. In particular the NSW DET policy (2001a) regarding EfS had been introduced to the school some years earlier, in a practical way through a day of special workshops, supported by local council and attended by teachers, students and parents. With regard to curriculum, a scope and sequence for science and social science teaching K-6 was devised with sustainability at its core. Units of work that were already being taught were coupled to a sustainability teaching purpose. The units, written as site-specific to the school grounds and wider locality, were resourced and trialled. In this way the principles of sustainability were taught in an organised way throughout the school as well as being integrated opportunistically into English and mathematics [Jan:int:6.8.08].

As an example of this curriculum planning in operation, social science and science were taught to all Stage 1 students by one teacher. In effect this meant that class

teachers of these students did not teach those two KLAs. The teacher responsible for social science and science teaching for Stage 1, Ellen, explained how learning in those two KLAs for all Stage 1 students was related in some way to the growing of the vegetables that flourished in the school garden. In this way children had experiences in planting, plant maintenance, measurement, plant investigations and investigations into the life cycle of plants and animals. Children compared the production of food grown locally with processed and transported food in terms of the journey of a strawberry they consumed as purchased strawberry jam compared with one that they grew themselves. Photo displays showed how they grew and sold produce to families by holding a stall at the school. Ellen explained how they learnt in a practical way about the connections between their own lives and the plants and animals around them, and about the sun as the source of energy in food. Ellen displayed shelves of children's literature that supported practical activities and showed a variety of methods of syllabus-related analysis and recording appropriate to this stage. As explained below by the school principal, these early experiences were considered to be essential if children were to be able to later grasp the meaning of more complex ideas such as carbon trading. Energy and water were topics integrated into Stage 3 learning by Stage 3 classroom teachers, whilst waste management including composting was part of the Stage 2 curriculum.

A whole school culture of sustainability was maintained through special events such as the celebration of a Green Day held during 2008. On this day, specialist presenters from amongst, for instance, local council, the Environment Centre and parents, were invited into the school to offer activities for students on environmental themes. All classes in the school rotated through a series of workshops that were informative for both students and teachers. Year 6 students described another example which was a combined schools march, devised by Year 6 students, for the purpose of publicising the climate change issue. This event attracted favourable local media attention as indicated by photographs and newspaper reports on display in the school foyer, and this may have acted to further cement the sustainability ethos of the school. Other special student projects were in evidence. Photographs showed students involved in activities such as presenting the results of their water audit to local council in the council chambers. Students described how they ran web-based surveys to parents

regarding water use and used the internet to communicate and compare the results of waste audits with partner schools in India [Te:int:4.8.08].

Whilst the above description of the environment-related activities of the school focuses on planned teaching, planned events, and how planning was undertaken in an inclusive way through soliciting of the views of all stakeholders, there was also opportunity for any student with a particular interest in the environment to belong to the student Yandooyah Club. Activities of the club, which met at lunch time, focused on a bush area called Yandooyah. The students in this club proudly explained how they took on responsibility for bush regeneration, provision of possum boxes, labelling of plants, and provision of a frog pond and seating area that could be used by all classes in the school.

Rostered responsibilities, some of which are described here, operated as part of the culture of the school and were displayed on notice boards. All students as class groups supervised by class teachers had responsibility for particular tasks pertaining to sustainability of the operation of the school. All children and staff were expected to be responsible for the sorting of their own waste for the purposes of recycling. Stage 1 children were observed collecting and washing plastic bottles for recycling. Stage 2 children took responsibility for compost making and feeding chickens, processes which they competently described. Stage 3 children monitored water and energy use. Every person was expected to 'do their bit' for sustainability. Bins for sorted waste were visible outside, meaning that staff and student recycling activity was there for all to see. In this way teachers were encouraged to set a good example. At assembly, the week's water audit results were displayed and reported to the whole school by Stage 2. The water use results were the product of a whole of school community effort to conserve water. Reporting positive results reinforced the message of water saving and promoted the cooperative nature of the effort. Opportunities for learning about sustainability were maximised through the organised sharing of tasks.

Whilst careful attention was given to the role of students as investigators of environmental issues, as planners, decision makers and actors for the environment, the school also had in place a reward system:

We've got a snap ticket system where if kids voluntarily pick up rubbish they get a snap ticket. That's a reward to keep our playground nice. We've got an orchard that they're meant to stay out of and we've got a lot of grass that's meant to be growing that they're meant to be caring for as well. It's just a rule that they're meant to be looking after it. It's just something they have to do [An:5.6.08].

Here Andrew is describing an incentive scheme that was used to encourage children to engage in everyday routines that protected the school environment. The establishment of these routines was an expression of positive environmental values regarded as important in the school. This is an example of what Vare and Scott (2007) described as ESD 1. In this school, exemplary in its interpretation of ESD 2, there was still a definite place for ESD 1 as well.

The school had established another routine structure that contributed to its cultural identity. As described by the principal, teachers met once every three weeks in one of three teams, team membership being selected by individuals for the forthcoming year. They were the (1) curriculum, (2) health and welfare and (3) sustainability teams. Throughout the year each team focused its attention on development in its specified area. The principal, Andrew and Jan all described how the sustainability team conducted activities such as organising special events, for instance Green Day, working on project funding and monitoring sustainability activities in the school.

Beginning teachers were provided with special support when they entered the school. As described by Kerrie, Andrew's supervising teacher, particular attempts were made to provide a beginning teacher with a class of children who were relatively readily managed. Kerrie met with Andrew frequently to review any concerns he may have had and to assist with interpretation of the curriculum offered by the school. In particular, the school followed specific pre-written programs in mathematics and spelling, and specified a teaching sequence for grammar and writing. Extracts from the pre-written programs were evident in Andrew's teaching program.

This description shows that there was a celebrated and public culture of sustainability and Education for Sustainability at Fishington. There were several features of the organisation adopted in the school that are identifiable as a whole school approach to sustainability. Whole school features included broad processes of consultation, across

curriculum teaching in relation to environment, resource conservation, and engagement of students in investigation, critical thinking, planning, decision making and action in an environmental context. All the elements of Chawla and Cushing's (2007:449) list of actions for environmental educators seeking student competence in environmental decision making and action were in evidence. All teachers were encouraged and supported to participate in the environmental programs operating in the school.

Fundamental to the success of the above structures and activities were the underlying attitudes and expectations of personnel in the school. The principal, Terrence, was new to the school and had adopted a 'wait and see' attitude during the early months of his tenure. None-the-less he supported the environmental programs operating in the school. When asked what he considered most important in primary schooling, he replied:

Our core business is literacy and numeracy and the other KLAs. However teachers can be very creative. You can get really quality programs and the content may be environmental. Whatever they're doing with the environment, it comes back to making sure it has a firm literacy base and a firm numeracy base. There has been a change from 'environment' to 'sustainability'. It's no longer planting and weeding and there is a difference between planting a tree and carbon credits: it's about getting the idea that we are responsible for more than our little part and that's hard for little kids to understand, which is why you start them in the garden planting seeds [Te:int:4.8.08].

Terrence understood that environmental work could be integrated across the teaching program and could be associated with excellent teaching practices. He also understood that EfS was about children making connections with the environment that supported them, and also about developing a sense of social responsibility, broader than individual responsibility for the environment. These elements of his conception of EfS were consistent with Tilbury (1995), the NSW DET *Policy* (2001a) and also supportive of processes already in operation in the school.

There were indications of strong parent support. One parent, Barry, for example, was delighted to help with all environmental projects:

I've been more than happy to assist where I can. It's been such a great lesson for the kids because it is about connectiveness [Ba:int:8.8.08].

He regarded his views however as not representative of parents as a whole:

I don't think they're a particularly motivated group of parents. But when there's simple tasks and a call to arms and lots of direction there's lots of willing hands [Ba:int:8.8.08].

Children in the school appeared to be courteous and to take care of the yard which was attractive and clean. Year 6 students made the following favourable remarks:

Interviewer: You've been involved in the sustainability projects in this school for a long time now haven't you?

Vic: Yep I have

Interviewer: So what do you think you've learnt from all these projects?

Vic: Just how our environment works and the food cycle and everything and like how we can look after our environment and how valuable it is to us [Vi:int:7.8.08].

Interviewer: You were telling me about your previous school.

Kay: This school [Fishington] is very environmentally friendly. North Hill School doesn't do everything like this. They don't have fruit trees. They don't have a big Yandooyah area which is a bushland area. This is a pretty good place to be [Ka:int:7.8.08].

Not all children of course shared an interest in the environment. Year 4 students were responsible for compost duties. Their teacher, Joelle, reported some difficulties:

Joelle: So there are complaints [about duties] but on the whole, generally the kids sort of see the bigger picture when we actually get the compost out of the bins and put it on the gardens.

Interviewer: So do you mean the kids can actually constrain what you can do?

Joelle: Yes I think so a little bit. One of the science units I had to do was redoing part of the school yard. And the behaviour issue became too much for me. I couldn't contain some of them in the class. So therefore I couldn't take them outside. It was just a waste of time. Sometimes you wonder if the reliable ones are missing out on the higher learning and the deeper knowledge you can get out of the project so it is hard [Jo:int:6.8.08].

Joelle none-the-less appeared to accept the prescribed scope and sequence of science and social science topics, recognised the value of environmental projects and was keen to pursue EfS wherever she could.

The whole school approach to EfS adopted at Fishington was founded upon a culture of cooperation and a sense of common purpose within the school community. This

culture of cooperation had been skilfully built, initially through the one key player, Jan, over a period of years. Several people alluded to Jan's influence in building up a culture of sustainability in the school. An example came from Barry, the parent supporter, who recognised Jan's efforts, working at weekends and after school, working with the Yandooyah club during lunch and with networking beyond the school gate:

This school is blessed by Jan. Jan is a totally committed person that should be rewarded over and above a teacher's salary for what she does. In my mind she's had far more effect than any principal has ever had in this school [Ba:int:8.8.08].

Because Jan had had such potent influence in shaping the sustainability culture of the school, insight into her conception of EfS, as evidenced through actions in the school and from her reflective comments, is important to an understanding of the culture and the achievements of Fishington. Her conception of EfS, entirely consistent with Tilbury's (1995) definition, was the basis of the vision that moved the school's sustainability initiatives forward and impinged on every person in the school in some way.

Jan understood that the basis of EfS was learning of sustainability concepts as a part of curriculum. She ensured that children had opportunity to understand what sustainability could mean through core class work and worked with another teacher to organise a suitable scope and sequence of teaching for all stages:

I came off class. I then took the RFF (Release from Face to Face) teaching program for two years and we dovetailed it [EfS] into our Science and Technology and HSIE programs for odd and even years and we took all of those units that we were currently teaching and married them up to a sustainable purpose, to the sustainable principles [Jan:int: 6.8.08].

The development of a scope and sequence in all areas of learning is common practice in NSW primary schools. Jan applied a framework to this routine practice for a cohesive and coordinated curriculum-integrated approach to EfS. Along with the principal, Robert, she understood that an ad hoc approach to curriculum integration of EfS would be unsatisfactory (as did Butler, 2009) because children could not be expected to understand more complex ideas if they had no prior experience of simpler concepts.

Jan also engineered a program of professional learning for teachers:

We did our initial workshops, where we introduced the policy, in a practical way. So I didn't just sit teachers down and work through the policy. I set up the workshops. I invited all of the parents to come and participate in those workshops with the students and we had very much the support of Parry council to do that. We had a workshop on biodiversity for example and auditing. We had workshops around energy. We had all the different aspects that we could cover. So we sort of gave a practical big picture of what we were aiming to do [Jan:int:6.8.08].

Jan, it would appear, wished to develop the interest of teachers in EfS, in the realisation that their personal enthusiasm and confidence were important ingredients in a successful culture change. As has been reported elsewhere (Sergiovanni & Starratt, 1988), she seemed to recognise that introducing the policy as something for which implementation was mandatory and therefore everybody must abide by it, as is in fact the case, was unlikely to motivate teachers to use it.

As part of curriculum, children audited their personal water use, but Jan's conception of EfS extended further to collective action by students on water management, an issue which remained significant because of local and national water shortage:

Jan: Last year the Year 5 did an extensive water and storm water audit of the school. Right from going through and counting all the taps and labeling the taps, bubblers, etc to making recommendations regarding where the problem areas were and putting those to our P&C. And then compiling a power point presentation with findings for the wider community at Parry Council. And they actually did a presentation at the council chambers with all the councilors present and some of the council engineers and workers [Jan:int:6.8.08].

The water related problems were identified by students and their suggestions for solutions were considered for inclusion in the new SEMP.

Jan understood the socially critical elements of EfS and the necessity for identifying the underlying social causes of unsustainable life styles:

And I also think there needs to be a braveness in thinking in a way that I guess is more political, an influence in political will. And I think that it has to be something that has the support of all teachers. Sustainability asks that of people. It even challenges our value systems very much. And we have to address the fact that we can't exist the way we have existed. We have to make changes. And those changes are in the way we've constructed our society [Jan:int:6.8.08].

Consistent with this view, Jan provided opportunity for students to act democratically and collectively in the local area. With regard to water:

They've written to local businesses and told them about this and invited politicians and we're much more a part of the community than we were before these programs started [Jan:int:6.8.08].

In another example, the principal described action arising from Year 6 study of climate change. Students planned a public awareness raising event that drew in many local groups.

Interviewer: Do you see any projects or is there any curriculum emphasis that promotes decision making by students?

Principal: I think a project that was underway when I came was the climate day. Early in term 2 there was a community event combined with the high school and two or three other schools and the Zoo and the Environment Centre and the [local] Community Centre. It was a climate day of action. Now a lot of the planning for that I know took place in term one and it happened in about week 3 of term 2. And I know the children had a large part to play in that because they planned things to do, what they were actually going to do on this climate day of action. What kinds of things would be within their realm to do, how would it have been able to be done and they worked through the sustainability team. On that day they had a combined march from here, from the high school to the Environment Centre carrying black balloons and each one represented, I think, the amount of carbon the average car puts into the air. So they had it all worked out what it all signified. And they made sculptures representing the environment and the Earth when they were there and they had speeches and they had involvement of quite a lot of people but the students were involved in part of the planning.

Interviewer: Was there any opposition? Were there people who saw that as political social action outside the gambit of a primary school?

Principal: Not that I was aware of and because it had such wider community support: it wasn't just this school and its children. There was the high school, the environment centre, the zoo, it was a community event. It was a very successful day [Te:int:4.8.08].

These events emanated from the efforts of Jan and the environment team.

The above examples suggest that Jan conceived of EfS as a learning process that had to be a part of the teaching program throughout the school; a team effort; critical of social norms; a learning experience where students' learning connected them with their local environment and their local community, where they participated in decision making and collectively expressed their environmental concerns within the community; and something that establishes 'a real connection with ourselves and nature'. This connection is 'not something you can force and you can't ask people to value it without understanding it' [Jan:int:6.8.08].

This view of EfS, which Jan had promoted and managed, gave practical demonstration of Tilbury's (1995) definition and the NSW DET *Policy* (2001a) and it permeated activity in the school. It would appear that broad adoption of EfS throughout the school was an established and strong element of the school's culture. It was characterised by a high degree of cooperation, acceptance of new learning and outstanding effort by several people who were prepared to provide leadership in environmental work.

Acceptance of the culture of sustainability is implied by the achievements and routines established in the school. The nature of this acceptance is apparent in a remark from Kerrie, Andrew's supervising teacher:

But I think once you become part of this school, and this is my third year here, and I hadn't worked in a school where it was such a high profile focus, it [EfS] kind of just gets embedded into your thinking sort of incidentally all the time. And I think you can't help but make that part of your day to day teaching. Just from being in here and everything that happens [Ke:int:6.8.08].

Kerrie, it would appear, had adopted the sustainability ethos of the school.

Jan had intentionally worked to develop a culture of support from teachers and others. When asked what she believed to be her greatest support in the school, she replied:

Several of the staff members who I have to say were not very supportive in the beginning. Not in a detrimental way. They simply thought well this is something: doing audits for example, they thought the Department should be sending out a team. They didn't think it was what the school should be doing and what the curriculum should involve. But in that process of learning and actually sharing it with them and workshopping it through they've come a full 360 and really understand it and actually are involved. So there's a really good supportive team of teachers. And certainly outside organisations like AAEE [Australian Association for Environmental Education]. I think having surrounding schools is vitally important and having people you can bounce ideas off and share your experiences with. I think it's having like minded people and people who are prepared even if they don't understand the science behind it; who are prepared to learn and value it [Jan:int:6.8.08]..

Interviewer: And the greatest barriers?

Jan: Certain parents. Also legislation. See, trying to implement big projects you can't get around bureaucratic processes. Cost is another thing obviously. Time. Energy. And also people lose motivation along the way. It's actually very hard. And the results from it are very slow so you have to have persistence and patience. But I just have faith that eventually they come to it with their own time

frame and their own understanding as to how much they take on board [Jan:int:6.8.08].

In recognition of the fact that teachers lose motivation and even become isolated from the beyond-school world around them, Jan encouraged provision of professional learning for teachers of a kind that would stimulate interest:

I would like to see key note speakers. Often they go to the principal's conferences. Teachers also need motivation. They need to know that what they're doing is real and relevant. And I think you can't rely on one person in a school to be the font of all knowledge so to speak. It's much better and healthier for school communities to talk to the scientists or to be able to connect with other disciplines outside of the school. That's what sustainability is, that's what teachers need to see in action. And we are institutions where we often are sheltered from a lot of the things that happen outside of our school gates [Jan:int:6.8.08].

None-the-less, Jan was aware of how the culture of sustainability could easily be undermined:

The only challenge, and this is where it concerns me is when you have someone who does come into the school, who has hardened attitudes about what education should be and shuts down to that type of learning. And that can happen with the parents as well. If they don't think the children should be outside or if you can't validate what you're doing they can be quite vocal and cause a lot of problems [Jan:int:6.8.08].

In view of this remark by Jan, it would seem particularly important for pre-service teachers to have experience of the nature and processes of EfS as part of a change process. In this way they would have had opportunity to become familiar with the style of learning and teaching implied in EfS.

In summary, the outstanding achievements of the school were built upon a team effort with dedicated leadership and a championing of the cause. Widely recognised as leader, Jan was courageous and determined, inspired by 'a deep and profound love of the Earth, what it does for us, its systems that it has in place' [Jan:int:6.8.08]. The culture of the school as described is relevant to an understanding of the beginning teacher's response. This is because the school's culture with its attendant norms and expectations is an influential component of the context within which the beginning teacher works (Flores & Day, 2005).

7.4 Andrew's views of EfS as pre-service teacher

The phase two question asks how the beginning teacher engages with EfS and why. As a starting point, it is likely that beginning teachers will continue to be influenced by the values which they initially take with them to the profession (Pajares, 1992). For this reason it is appropriate to inquire into the views held by each individual prior to commencement of teaching. This information was obtained initially through Survey A, administered to the cohort of students at the beginning of the university unit (T1), through the repeated survey (Survey B) at the completion of the environment unit (T2), and during Interview A (T2).

As a pre-service teacher, Andrew began the environment unit rating his desire to include EfS in his teaching as 'strong' because he believed that people needed to 'take responsibility for a healthy future for the planet' [An:surv:T1]. In Survey B he rated his desire to include EfS in his teaching as 'very strong' with his reason being 'for our future, not just for humans but for ongoing sustainability of the environment' [An:surv:T2]. His reasons at T2 specifically allude to sustainability of the environment, acknowledging it as intrinsically valuable and not only of utilitarian value. This and Interview A remarks from Andrew suggest that environmental values were important for him, and that over the unit he had gained a deeper understanding of the need for EfS.

Survey ratings indicate that Andrew's confidence to include EfS was initially 'medium' [An:surv:T1] but improved to 'confident' [An:surv:T2]. These ratings reflected his shift from not having 'sound knowledge' [An:surv:T1] and 'not knowing strategies' [An:surv:T1] to feeling that he had 'knowledge of the resources, issues and how to teach it': 'why, how, what are future prospects and what we can do' [An:surv:T2]. He believed teachers had an important role to play and that he had the knowledge of resources and strategies needed to embark upon EfS [An:surv:T2]. On the basis of these data it could be suggested that Andrew, at the completion of university study, anticipated that EfS would be a part of his future role as a primary teacher.

Andrew attributed his interest in the environment to his earlier life in a beautiful rural district, to his family's careful everyday practices such as reusing and recycling and to school science experiences such as sampling the local creek for invertebrate life. From the university unit he attributed his interest in EfS to particular aspects:

Andrew: Getting out, that was a good way to motivate, to influence my motivation to do it. Like seeing the eco-house the other day, going up into the woodland and seeing the different types of environments that way. Experiencing things has been good and especially I enjoyed watching that video 'An Inconvenient Truth' [presented by Al Gore and widely distributed during 2006/07]. That was a really clear way of showing what's happening and the details of it [An:int:T2].

Andrew found instances of experiential learning to be both engaging and motivating, as has been reported elsewhere (Ballantyne & Packer, 2009), and in this instance the values implicit in the activities of the university unit built upon his earlier family experiences.

Andrew was a talented musician and had specialised in creative and performing arts during his teacher education years. He felt however that his knowledge relevant to EfS had improved:

I was aware of environmental problems like a shallow understanding of it whereas now I have a much deeper understanding and I guess that would give me confidence I think in any subject area. If you have more knowledge you're going to have a bit more confidence as a teacher. Same with all the resources that you've used and the different strategies that you've used [in the university unit] to do it [An:Int:T2].

Andrew claimed that science was his weakest area of expertise. His insecurity in the area of content knowledge continued to contribute to a feeling of uncertainty:

Interviewer: Tell me what diminishes your motivation towards EfS.

Andrew: Oh I don't think I've got a very good knowledge. Like knowledge base would sort of lower my confidence a bit but at the same time I could teach it. I'd still need the knowledge but you're learning as well as students learn and I guess the next time you teach it you're going to be a little bit better off [An:Int:T2].

For Andrew, confidence increased with knowledge, but he remained uncertain of his expertise feeling that his knowledge was still inadequate. In this example, content knowledge appeared to have a critically important impact on confidence in EfS. Indeed the literature shows that developing knowledge is important in teacher

education (Grossman, 1990), in this instance knowledge of environmental or sustainability concepts, and teachers have been found to lack understanding in this field (Cutter-Mackenzie & Smith, 2003; Flogaitis, 2003; Khalid, 2001; Parlo & Butler, 2007; Skamp, 2009; Summers, Corney, & Childs, 2004, 2005; Summers, Kruger, Childs, & Mant, 2000; Zak & Munson, 2008; Zemits, 2006). Background knowledge of both subject matter and the pedagogy of EfS are here identified by Andrew as being important because they augmented his feeling of confidence.

Andrew's interview responses imply that, at the completion of his university studies, he had the intention to proceed with EfS and felt that he had some skills to do so. He recognised that the environment provided a rich context for teaching and learning: 'it's a more practical and relevant thing to be teaching' [An:int:T2]. In terms of values, he construed contemporary Australian lifestyles as 'excessive' and recognised the challenge of EfS, that 'it's not simple how you change your behaviour' [An:int:T2]. Andrew at the completion of his university studies, was expressing an interpretation of EfS that cohered in many ways with Tilbury's (1995) definition: he recognised the change aspirations of EfS; that there are change processes; there is a role for student agency to make changes; and he described EfS as holistic in a curriculum sense.

7.5 Andrew's perspective: personal motivation

In contrast, Andrew maintained that, as beginning teacher, he felt less inclined to incorporate EfS into his work:

Interviewer: Do you think you feel more motivated or less motivated to include EfS than you did a year ago? Can you rank motivation 1 to 10 where 10 is lots. Can you account for this?

Andrew: I think after doing 412, straight after, I was very motivated. I remember we watched that movie that was very powerful: I felt really motivated to get some awareness out there. I think I'm still fairly motivated.

Andrew: I am motivated. I think that [sigh] yeah, I guess in my classroom I'm motivated to put these topics in and stuff like that. Out of 10 maybe 7, 7 or 8.

Interviewer: So I'm hearing from someone who had a quite strong desire to include this in their work to someone who now has it not so much to the fore. How do you account for that?

Andrew: Yes it's not as important any more. I dunno. I think there's so much else that I'm doing and that I want to get done and like [pause] you want to get

their literacy up and their numeracy and everything else and then you've gotta do this as well. So there's a lot of things you've got to be [An:int:4.6.08].

Even in this school with its exceptional environmental programs, Andrew, whilst admitting to feeling quite confident to teach environment related work, experienced declining interest in EfS. This appears to be partly attributable to competing priorities in his new career. Additionally the impact of 'An Inconvenient Truth' (a film about climate change), so potent for many of the pre-service teachers and fresh in Andrew's mind at the time of the earlier (T2) interview, had diminished over time.

7.6 Andrew's perspective: school culture

Andrew was aware of many of the EfS projects running in the school, and he identified the enthusiasm which many of the children, including children from his class, displayed for environmental activities:

Andrew: I've seen a lot how the kids are really into it. The kids are very involved in it and like there's a Yandooyah club on Tuesday at lunch time. I don't have much to do with it because I do other things but heaps of my kids are so into it. It's not a boring topic for them. They're into it and they love the chickens and the worms. They go and weed or they plant trees or they pick up rubbish [An:int:6.8.08].

In describing these activities Andrew was acknowledging his awareness of the culture of sustainability in the school and the interest of primary age students, both of which would support integration of EfS into teachers' programs.

Fishington was a highly organised school and Andrew had responsibilities to the staff sustainability team:

Interviewer: Can you tell me about the sustainability team please?

Andrew: There's four teams. There's literacy and numeracy and CAPA and then there's the sustainability. And so the staff at the start of the year just get marked off what team they're going to be in.

Interviewer: Oh they're told?

Andrew: Being a new teacher I just got put in it.

Interviewer: So which one are you in?

Andrew: Sustainability and on Monday afternoons, every third one will be a team meeting so I'll go off to our sustainability team. We just work towards different projects that are happening in the school. At the start of the year we were working towards this working bee we had one Sunday and so each person got a job that they had to organise.

Interviewer: What did you have to do?

Andrew: The possum boxes. Climbing up trees putting up the possum boxes. The kids in Jan's class actually made the possum boxes so some of them weren't finished so we had to get people finishing the possum boxes and then putting them up. Right now we're organising Green Day in our sustainability team [An:int:4.6.08].

Andrew did not complain about any of the things he was required to do including out of class duties, participation in staff teams and the support requested there. One reason may be that all duties (including care of staffroom, taking responsibility for bottle recycling) were rostered. There was transparency in who did what and an air of everything being fair. Andrew related one incident where he had felt he had been unfairly treated. He had complained and the matter had been resolved in a fair manner. The fact that he was able to speak out and that management responded illustrates the point about openness and fairness.

Andrew's perspective on the whole school approach to sustainability, so pervasive in the school, was positive:

Andrew: It's good to see the whole school approach to it and the support that all teachers need to be giving to it for it actually to have some effect. Like I think if it was just one teacher trying to do it with just their class it wouldn't have much effect at all and it would probably be lost the next year when the kids move on so the whole school approach is good.

Interviewer: So there's value in that structure?

Andrew: Yeah and I think there is value in having Jan as a leader. Being part of the sustainability team is good [An:int:6.8.08].

At this point Andrew implied that he shared the values inherent in whole school EfS and recognised the necessity for consensus on behalf of teachers.

However, whilst he acknowledged the benefits of a whole school focus on sustainability, Andrew was aware that people gave it varying levels of support:

Interviewer: How does school culture assist or limit sustainability?

Andrew: The kids are very into it. Most parents seem to see it as a good part of our school. A lot of teachers are a little bit ... they don't see it as a hassle or a burden but they're not really that into it. Like Green Day is coming up and they're looking for it to work but they're not very keen and enthusiastic: 'What can I do?'

Even in this school, with its outstanding accomplishments in EfS, the required consensus was not necessarily forthcoming, and ongoing encouragement from those most committed was essential for EfS to continue:

Interviewer: What do you see as the limitations? What frustrates your efforts in EfS?

Andrew: None really. I think just looking at what this school has done. There're not really limitations if people are willing to help out and get involved. It's the attitudes. That's the only thing that can hold people back sometimes [An:int:6.8.08].

This conversation shows that Andrew was aware of EfS activities in the school and that he recognised what was happening as a whole school approach. In his view the children enjoyed it, most parents supported it, teachers accepted it as a part of their job and progress would only be limited by individuals who held negative attitudes.

The context and the culture of the school have been described. Andrew's interest in EfS, as he completed university study has been reported, as has his beginning teacher interpretation of EfS at Fishington. In response to the question, how does Andrew engage with EfS and why, the following section describes what Andrew does, then draws together his views and elements of context and culture to suggest an explanation for his teaching decisions in EfS.

7.7 How did Andrew engage with EfS and why?

Andrew's engagement with EfS occurred as part of the whole school program and as part of his own teaching program. As part of the whole school program, Andrew performed specific duties which included encouraging his students to sort waste correctly and supervising his class during their bottle rinsing duties. Andrew appeared to be happy to comply with these requirements as a part of a team effort. Membership of the teachers' sustainability team had been allocated to him:

Andrew: Yeah and I wonder if when I came to the school and I could have chosen, would I have gone on the sustainability team.

Interviewer: Yes because creative arts is your interest isn't it?

Andrew: Yeah [An:int:6.8.08].

Whilst Andrew was compliant with his duties as team member in a good-natured way, he was unsure of his commitment and desire to be there and this is not entirely

consistent with remarks reported above: 'Being part of the sustainability team is good' [An:int:6.8.08]. It would seem that at this early stage in his career Andrew had not confirmed his identity as teacher, and remained undecided with regard to what was of greatest interest to him.

Andrew fostered children's positive attitudes to the environment as well as a sense of personal responsibility. His fostering of positive attitudes and personal responsibility, as described below, was often incidental rather than planned. As pre-service teacher, he conceptualised EfS as a development of positive attitudes and caring about the future and this interpretation of EfS was evident in his everyday incidental work. Seldom evident in his teaching were other particular elements of his pre-service conception of EfS such as planned development of student content knowledge, development of children's sense of agency for change (problem solving and decision making), and use of pedagogical approaches such as strategic integration across KLAs.

To some extent this could be explained by the way in which Stage 1 teachers shared their programming tasks. Text types for writing in English were standardised. Spelling, grammar and mathematics were all pre-determined for the grade and programmed according to various pre-written schemes. Within this set structure teachers had a degree of discretion in choosing their own content topics. Andrew sometimes chose environment related content, thereby integrating it into his required programming. In this way Andrew chose *The Hungry Caterpillar* as content for a pre-determined teaching segment on writing descriptions. He explained his use of the content topic:

Well here we're just talking about biodiversity and the animals, how they develop and what they need [An:int:6.8.08].

Similarly he chose a segment of work on life cycle of a butterfly:

I did life cycle of the butterfly and they [the class] knew that we were going to be doing biodiversity for Green Day so I guess that's some of it.

Interviewer: So you have chosen to look at natural things as part of your literacy and creative arts programs?

Andrew: I just did life cycle of a butterfly to link to what they were learning in HSIE. I didn't consciously do it because I wanted to do environmental ed. I did

it more because we were doing descriptions at the time and I thought, ‘This was a topic that’s going to work’ [An:int:6.8.08].

Similarly, Andrew explained the children’s artwork display of dragon flies as follows:

The dragon flies came about because on the excursion we went to the Environment Centre. We were looking at dragon flies and we saw these banksia leaves, and we came up with that together [the display where representations of banksia leaves functioned as the wings of the dragon flies] [An:int:6.8.08].

The excursion to the Environment Centre was an annual event and was organised by the RFF teacher, Ellen. Whilst the above instances could be construed as being part of his planned EfS experience for the class, Andrew’s remarks suggest that environment related content in his teaching was just as likely to be about choosing something ‘that’s going to work’ at the time, and was selected for reasons other than intention to engage with EfS. In a later interview about his program, Andrew discussed under CAPA (Creative and Performing Arts) the work on dragon flies. He showed how he integrated it into his English program, explaining how this was really about English and developing field knowledge of living things. He did not mention how changes in water quality or other environmental parameters may have affected the dragonfly. In short, there was nothing in his responses to suggest that he developed understandings about the dragon fly’s connectedness to other creatures and its dependence on particular parameters of the physical environment: in this case EfS issues were not drawn out.

Andrew described an instance where he chose a text to use with the class and then intentionally lead a discussion about it in order to assist the children to link human activity with particular impacts on the environment:

I did the Jeannie Baker book, the *Hidden Garden*, which was all about the pollution of the water and things like that so that was a good one. When I was doing recounts we read that and we did discuss it. That was the environmental ed. part where we discussed what was happening to the water and the land and what could they see and what effect was it having [An:int:6.8.08].

These examples appear to be consistent with Andrew’s conception of EfS:

Andrew: (EfS is) just an awareness of what is happening around them and an awareness of I think the issues and then also what they can do. I guess firstly to

be aware of what's happening and then secondly be aware of what they can do to become involved or contribute to it like how their actions can in turn have an effect.

Andrew: I guess for me it's not having a big love for nature but just having an awareness of the influence your actions can have, knowing what influence you have and what that's going to lead to, and how many people working together can have that effect or lead to this [An:int:6.8.08].

His focus appeared to be the effects of human action on the environment, the implications of this for the future and how people can change their ways to those more favourable to the environment. Indeed his observed lesson on the topic of water encouraged the children to think about impact of their actions. It appeared from this and earlier comments, that the notions of the interdependence of all life, of the basic ecological understandings that enable students to reflect upon their actions and actually imagine how they may affect other life forms and the linkages between them were only superficially represented in this EfS related work. Such an omission may in fact be a reflection of Andrew's admitted weakness in science. Additionally, absent from Andrew's programming is the provision of opportunity for children to actively pursue investigations in the environment. Using the life cycle of a butterfly as an example, children as part of English read about the life cycle and as part of creative arts made representations of the butterfly. There was no programmed opportunity however for children to observe butterflies or caterpillars outdoors, to investigate the links between butterflies and their environment or indeed to conserve or provide some butterfly habitat in the school.

Conserving butterfly habitat in the school would be consistent with Andrew's goal 'I think it's more important for them to know how they can contribute' [An:int:6.8.08], but he did not pursue it at that point. An example of how Andrew did approach his goal of ensuring children know how they can contribute, arose through his English program:

Interviewer: So you have chosen to look at natural things as part of your literacy and creative arts programs. Was incorporating those things easy or hard?

Andrew: I think it was easy. I think that when I see an opportunity to do something like that I'll do it.

Interviewer: Why do you think it was easy?

Andrew: Well like I said I've got this motivation, not enthusiasm. But I recognise that these kids need to get these values and understanding in their

head and so when I see an opportunity like that: like when we were reading Jeannie Baker and there's litter in the water, it's an opportunity that you can jump on very easily to talk about what does litter do and where's it going to end up and what difference can they make.

Interviewer: So do you see yourself communicating values?

Andrew: Yeah and building that up. So if there's opportunities I'll do that. We were out in the playground and we were walking back and one of them said, 'There's a lot of rubbish today', or something like that. So we all went and got one piece of rubbish, put it in the right bin and then I think, for two minutes, I said, 'Oh what would have happened if I'd left the rubbish there?' You can jump on those opportunities and just slowly build up [An:int:6.8.08].

In this way, Andrew was asking the children to make connections between their behaviour and environmental impacts; he was modelling responsible environmental behaviours and encouraging his students to do likewise. Similarly he ensured that paper in the classroom was reused and recycled and that electricity for lighting was conserved. At this point his approach to EfS in curriculum could be described as incidental.

Andrew's response to EfS interpreted in terms of Tilbury's (1995) definition is illustrated in Table 7.1. Andrew was encouraging positive environmental values of the kind which had been a part of his early life, and actions indicating care for the environment were an everyday part of his work. None-the-less Andrew's actions in EfS appear to fall short of the strategically planned expression of EfS as described by Tilbury (1995). The fact that Andrew was teaching very young children must be taken into account. However it appears that at this early stage in his teaching career, there was limited evidence that Andrew had taken the opportunity to implement some of the understandings of EfS which he held as pre-service teacher. This could be because of his pronounced lack of enthusiasm to do so, but further aspects of Andrew's work context have yet to be considered.

In particular, for the children in Andrew's class, the connectivity of life was very much a part of the learning experiences delivered to them by the RFF teacher, Ellen, through the science and social science program, rather than as something addressed by Andrew. Some of the children had a particular interest in the environment and had joined the Yandooyah environment club.

Table 7.1: Coherence of Andrew’s actions with Tilbury’s definition of EfS

The definition of EfS used here is that offered by Tilbury (1995).	Andrew’s actions
EfS has relevance in that it deals with contemporary issues of concern to learners who are encouraged to explore links between their personal lives and wider environmental and social concerns.	Andrew encouraged students to explore links between personal lives and water use and personal behaviour and littering
EfS has a holistic curriculum base in addressing environmental issues and in teaching and learning, identifying the whole picture surrounding an issue.	There was very little evidence of this - certainly EfS was not programmed in any way. There was ad hoc and partial discussion of issues.
EfS not only teaches about values but also teaches values, in this case ‘an environmental ethic which EfS has sustainable living at its core’; highlighting ‘the importance of valuing the interrelatedness of the web of life and promot[ing] the principal value of concern for all life forms’ (Tilbury, 1995:201).	Andrew taught values such as conservation of water and valuing of life through the aesthetic appreciation of the dragon fly and through the study of butterfly life cycle.
EfS is issues-based wherein students ‘consider matters of fact, values and morality’, to allow for an ‘exploration of moral, social and political values required for the development of an environmental ethic’ (Tilbury, 1995:202).	There is no substantive evidence that this occurred in Andrew’s work.
EfS is action-oriented, both in encouraging learners to personally and collectively take actions towards sustainability, and in promoting the use of active teaching and learning strategies.	Andrew co-operated in the sustainability activities organised for his students by the school but this was process learning not initiated by him. Here his contribution was to sustainability as a product (eg ensuring the children sorted waste correctly) rather than to sustainability as a process of learning.
EfS involves critical education, that is, an education that develops socially critical and political literacy skills, necessary because of the social complexity of environmental issues.	There is some evidence of this but critical education is not a planned and substantive element of Andrew’s program.

Whilst Andrew recognised incidental opportunities to develop pro-environmental attitudes and behaviours as detailed above, other opportunities were overlooked:

Interviewer: So what proportion of kids in this class would go to Yandooyah?

Andrew: About a quarter maybe.

Interviewer: And does what they do there at Tuesday lunch time, does that ever spill over into what happens in here in class or what kids talk about in here?

Andrew: No. One day they were planting trees and I heard them talking about planting trees, but no [An:int:6.8.08].

Andrew was aware but did not develop their interest through his class activities nor did he take opportunity to encourage members to report on their Yandooyah endeavours in a way that may encourage other children to join the club.

Similarly, Andrew did not appear to exploit the science and social science experiences of his students with of the RFF teacher, Ellen:

Interviewer: Do the children talk about what they do over in the garden?

Andrew: We talked about their broad beans so that was a little bit of a discussion [An:int:6.8.08].

It would appear that there was little communication between Andrew and the RFF teacher in terms of what learning was occurring and how a coordinated approach may have improved the learning experience of the students, helping them to make links in what was being delivered to them. Evidence of lack of communication at this level comes from Andrew:

Interviewer: Did Ellen tell you about her program?

Andrew: No. This is what we've got. This is her sustainability unit. I have seen this: they did draw a picture of our school garden. But my kids could write. My kids could write [An:int:6.8.08].

Andrew was somewhat critical, believing that his students could have written about the garden and that simply drawing it was a wasted opportunity for them to practise writing skills.

Andrew had received a written account of what was being delivered by the RFF teacher. The fact that communication between them had perhaps been inadequate may have been because Andrew, as a beginning teacher; had his focus elsewhere. He was responsible for the learning program of the children in his class, but as beginning teacher overlooked the importance of linking their total learning program, even though he had realised that there were disadvantages from not doing so. This could be because, at the time of investigation, he had been a teacher for a little less than three school terms and probably still needed to attend closely to development of core teaching competencies (Frid, Redden, & Reading, 1998).

It is the nature of EfS and it is part of the NSW DET *Policy* (2001a) for EfS to be included in curriculum across the KLAs. Indeed Andrew admitted that having science and social science programming addressed elsewhere hampered his ability to deliver a more coordinated program to the children:

Interviewer: So you don't do the science or the HSIE. How easy or difficult is it to develop the continuity or themes during the day without programming the science?

Andrew: I do find it really hard actually. Because when I did my internship and I was teaching everything as an intern and I just found it so much easier because I just did a theme. I did growing and changing so in everything we were talking about things that grow and things that change and art was about that and writing topics were about that and it made it so much easier. I even got spelling words from there.

Without a theme it's harder. Without a theme you don't really know what's going on there and you can't see what's coming up either [An:int:6.8.08] .

It is therefore possible, that the organisation at Stage 1, designed to ensure sound curriculum coverage of EfS in the school, was in one way counterproductive for this beginning teacher in terms of the opportunity to integrate EfS into the areas of his curriculum responsibility. In the absence of a strong integrating theme from social science or science within his own program, Andrew tended to link much of his classroom work to the English literature text being used in the class for shared reading.

As part of an analysis of Andrew's involvement with EfS, and in order to answer the question about what he does and why, it is informative and pertinent also to consider the views that others in the school held of his level of interest and activity. The school was delighted with Andrew's performance in general. His supervising teacher, Kerrie, identified his talents and successes:

Yes he's fabulous. He really is. He's had no problems whatsoever. And he has such beautiful rapport with his class. But really has excellent behaviour management skills. He's doing a really, really good job. He gets along with parents and the kids love him.

I also think like his real strength is music. And it's so lovely just being next door to him. I hear him and he's able to use that really well to calm his class down and he uses it so much in his day to day work. He's very lucky to have that skill [Ke:int:6.8.08].

When asked specifically had he engaged in environment related teaching, she responded:

Yes in that he joined the sustainability team at the beginning of the year and he wrote that down as a preference. So he's heavily involved in that team and they meet once every three weeks. And as a team they're planning our Green Day. I'm not on that committee [Ke:int:6.8.08].

Andrew had in fact been *sent* to the sustainability team. Kerrie's evidence for his environment related activity seems to be far less detailed than her evidence for his general acceptance in the school. Jan, EfS leader in the school, when asked about Andrew's environment related interest gave an extended response:

Interviewer: Can you tell me about anything you've noticed that would suggest that Andrew has an interest or skills in EfS?

Jan: Mm. Well he's actually on the sustainability committee so I'm hoping he has an interest there although that's sort of an area he was just slotted into. ...he came and helped on the very first working bee. Because I'm not on his stage group and I'm not his supervisor I don't know much of what he's thinking. But on the sustainability committee he's very willing to help. He's got some computer skills that are great. Um, he's keen to learn. He's taking the biodiversity audit for example for Green Day. He's going to take that on and work through that. I really am hoping that by seeing what we do, what the committee's about, what the school's doing, that eventually he will feel confident enough to say 'I really want to go on with this', but I think he hasn't been in the school long enough for him to feel, you know. And I also, I know he's trying to get his head around just working with his class. So you've got to be sensitive to all those things. His classroom is fantastic. It seems well organised. I can see lots of things that he's working on that relate to sustainability even if he's not aware of it. He has participated in the bottle recycling program and I've said to him 'If you see problems in this particular program, the way it runs and works please modify it'. So I'm trying to encourage him to take on some of the decision making because I really believe sustainability has to work that way. So I think there's great potential is what I'm saying [Jan:int:6.8.08] .

She recognised Andrew's talents and value to the school and lucidly expressed her own approach and her aspirations. Overall however she was non-committal in her judgment and believed that it was too early to be otherwise. The principal, new to the school, admitted to not knowing Andrew very well and therefore being unable to comment.

Overall the evidence suggests that Jan's perceptions are generally correct, that Andrew was engaging in EfS in ways that he did not necessarily recognise and that in fact it was too early to make a judgment because he was still finding his way, still

distracted by other demands and still formulating his own identity as teacher (Flores & Day, 2005). Indeed Andrew's remarks suggest ambivalence: he was uncertain, had he been given the choice, whether he would have joined the sustainability team of teachers or the team dealing with creative arts.

7.8 What enabled and what constrained EfS for Andrew?

It is likely that the existence of a strong culture of sustainability in the school allowed any teacher who so desired to give their environmental interests and teaching preferences full expression. The practice of a whole school approach supported teachers' efforts providing many opportunities for incorporating EfS. The community as a whole appeared to have strong interest in environmental matters and there were parents and groups such as the local council and Environment Centre who were willing to assist. Amongst students in the school there was a high level of interest in environmental activities. Andrew's supervisor expressed positive attitudes to EfS as did the principal who willingly identified many advantages in the EfS program. EfS activities were publicly recognised and celebrated in the school.

The most notable constraint, from the teaching context, on Andrew's capacity to incorporate EfS stemmed from the fact that responsibility for integrating EfS into social science and science had been largely taken from him. Every teacher in NSW schools is entitled to 'release from face to face teaching' (RFF) for a few hours each week. Each school organises how that time will be used. At Fishington, social science and science were taught to all children in the three years from Kindergarten to Year 2 during the RFF time allocation and through the whole school EfS curriculum program.

Andrew therefore was not obliged to think about the integration of EfS into whole units of work, into science and social science, and he did not, given the necessity for him to perform other teaching duties, have the opportunity to implement pedagogical approaches such as the structure provided by Jensen's (2002) model which had been explored during the pre-service unit, and which shows the knowledge required for action competence. In this way much of the responsibility for EfS was taken from his control. Whether or not Andrew would have used the various approaches to EfS to

which he had been exposed during pre-service education remains unknown. Also unknown is whether or not all the environmental activity being provided in the school by others allowed Andrew to feel that he need not devote a great deal of his energy to it on the grounds that others were attending to it.

As beginning teacher, Andrew did engage with some aspects of EfS. He complied, in an amiable way, with his duties in association with the whole school EfS program and he integrated environmental values into his day to day teaching. There is evidence that Andrew was thoughtful regarding his own personal environmental impact, incorporated environmental content and positive values into his everyday management, and into his English and CAPA program to a limited extent. However, as a person skilled in the creative arts, he appeared to devote his energies there and to develop his persona as a teacher with expertise in the creative arts more than in the environment.

Overall this case demonstrates that neither a strong culture of sustainability in a school nor pre-service work in EfS of the kind to which Andrew had been exposed are necessarily precursors to a robust and determined teaching effort in EfS by a beginning teacher. The beginning teacher may choose to not engage substantially with EfS for any number of reasons. Records from interview and survey at the completion of the university unit showed that at that time (T2), Andrew had an understanding of many aspects of EfS. However, although he acknowledged the importance of EfS, he chose to engage with it to a degree which was less substantive than his interpretation of EfS at T2 would suggest he might. The question arises as to whether there is any aspect of the context of the school or of Andrew himself, which might explain why Andrew's motivation to engage with EfS appears to have diminished. One suggestion is that it may have been because the system, which saw responsibility for science and social science teaching (traditionally thought of as the main conduits for EfS), effectively removed EfS from his control, but he did not appear to take up the opportunity of at least making connections between the RFF teaching in EfS to his own areas wherein he held curriculum control. A further suggestion is that his lifelong interest in the creative and performing arts was of even greater significance in his

teaching decision making, and he revealed during interview that he hoped to take on a role in the musical productions of the school.

This does not of course mean that the pre-service work in EfS and the sustainability work in the school have no impact on the views and choices of the beginning teacher. It does mean that, whilst working within the expected parameters of the teaching position and the context of the workplace, the individual teacher has the autonomy to pursue their deepest interests. Despite Andrew's seemingly sound understanding of the nature of EfS and the need for EfS and the mostly supportive culture of the school, his interests other than EfS prevailed at this moment in his career.

The overall purpose of this research is to gain insight into ways in which teacher preparation in EfS can be improved, given the varied contexts of schools in which beginning teachers find themselves. For that reason, the following section provides Andrew's reflection on specific implications of this case situation for pre-service teacher education in EfS.

7.9 Links between what Andrew did and aspired to do and teacher preparation

As mentioned, Andrew had always been conservative with personal water and energy use and took care to recycle, but his improved understanding gained in 412 'made it [personal behaviours] a bit more relevant' [An:int:9.8.08]. His behaviour suggested a pre-existing care for the environment and attitudes and interests established before the teacher education years may remain influential on the programming and action choices made by the beginning teacher (Palmer, Suggate, Robottom, & Hart, 1999). However from his university studies he had a better appreciation of the importance of EfS in his work.

Upon reflecting on the undergraduate environment unit completed a year previously, Andrew recognised that the unit had provided him with familiarity with the NSW DET *Policy* (2001a) which was being used in the school. As mentioned above he was also able to recognise and appreciate the whole school approach operating in the school and the need for teamwork. It is possible that this familiarity contributed to his ready acceptance of the EfS roles assigned to him as part of the school team.

Andrew also maintained that the university work contributed to confidence in his abilities to undertake EfS:

I feel I would be able to do it. If I had to teach it I would be able to do it. Being part of the sustainability team: I feel quite comfortable being in it. If I hadn't done 412 I would be a lot more clueless and I wouldn't really know where to go, what to do. But if I had to teach HSIE and sustainability in my class I could do it quite easily or quite comfortably [An:int:7.8.08].

This remark further endorses the earlier interpretation that the allocation of all science and social science teaching to the RFF teacher left Andrew feeling that EfS was not his responsibility.

Both confidence and enjoyment seem to have emanated from particular experiences at the university, namely engagement with the kinds of activities that could be used with children in school:

Andrew: Best parts were doing the practical things like going out into the woodland at the top of the car park and playing the biodiversity game, getting out. It was good when we went on that excursion even to the sewerage plant and especially when we saw that ecological house that was good as well.

I would like to do that biodiversity game with my class later on. We've done a lot about water. I did my 412 project on water so I do a lot about water, water conserving around houses and around school and how they can do it [An:int:6.8.08].

Having actually experienced the biodiversity game, he was prepared to use it himself when the opportunity arose.

In addition he felt secure in his familiarity with the topic of water, because water had been his chosen field of personal investigation for the EDSE 412 inquiry learning project. Indeed some water related lessons conducted by Andrew as a part of his literacy program were observed. He appeared confident in his knowledge and ability to question the children such that they were able to develop visions of a world with water and a world without and to relate that to their own everyday practice. In this way, Andrew was able to use his understanding of water shortage issues by applying it to activities suitable to his literacy program and the developmental stage of children in his class.

When asked how the university unit could be improved, Andrew requested more work on that particular skill, meaning more undergraduate practice with incorporating the principles and activities used in EfS into the everyday context of teaching. His suggestions began with lesson planning, practice with program integration and more exposure to curriculum requirements:

It would be nice if you had some actual lessons or sequences of activities or lessons you actually put into place. Including it in your program and interrelating it to other teaching areas. I guess as well maybe some: yeah maybe some stuff on what is actually needed to be taught a bit more [An:int:7.8.08].

Andrew's earlier remarks showed how, in the absence of science and social science teaching in his own program, whichever book was selected for shared reading of English literature in the class, provided an integrating theme for work in English and other KLAs. This suggests that helping pre-service primary teachers to include EfS into their English program in particular, and familiarising them with children's literary texts that lend themselves to environment-related teaching is an important part of the pre-service program. Although this had been attempted in the university sustainability unit, it may not have been adequately dealt with:

Interviewer: When you look at your teaching program, what would be one thing that you could point to that you could definitely identify as EfS?

Andrew: That I would identify as EfS? Well the HSIE.

Interviewer: No I mean something you've done.

Andrew: That I've done? In here? [indicating his program].

Interviewer: Try in your English program.

Andrew: I think probably, um, well it's not a written lesson plan, but we looked at: probably the biggest thing would be that Jeannie Baker book. That would have been the biggest one. We had discussions after each reading about what could they see in the picture. Yeah and how could they change their actions and what would happen if everybody was littering and polluting the water and how is that affecting the jellyfish. It was jellyfish we were doing. How is that affecting the people swimming in there and things like that. And then we talked about how we're looking after it. And they didn't go off and write anything but that's still a lesson. We still had a big class discussion [An:int:7.8.08]. [There was jellyfish craftwork on display.]

In this example, Andrew was able to effectively use the English literature text to challenge children at Year 1 level to think critically about human actions and how they could change. However, until prompted he did not, as Jan had suggested could be the case, recognise this teaching as a part of EfS. The following suggestion arises: it

would seem that the purposes of EfS, as espoused by Andrew, could be better achieved if he were able to specifically align them in a planned way with his English program. He would only be able to do this if he held a clear notion of what he was trying to achieve in both English and EfS: to be conscious of his goals in both. Lacking is an understanding of how EfS was being sequenced throughout the primary curriculum in this school and that made curriculum integration difficult.

Andrew continued with suggestions for the third year practicum:

Andrew: We had to do a unit, prepare a unit of work for English [for the practicum experience] and they could easily say you need to have some sort of sustainability link.

Interviewer: Did they tell you at all the content area?

Andrew: Well that was when we had a two week prac and then a 6 week prac following on the same class. So the supervising teacher said, “We’re doing information reports”, or some teachers said, “This is my program you’ve got to do whatever”. But I think if there was a part of the assignment that said to the teacher “You should request some sort of sustainability awareness” [An:int:7.8.08].

Andrew’s remarks support an integrated presentation of EfS across the units comprising the BEd(Prim), and this is one component of the mainstreaming model suggested by Ferreira, Ryan and Tilbury (2007b).

Andrew’s ideas extended further to ways in which actual teaching practice could be incorporated in the environment unit:

I didn’t get to do the thing where the kids came in and you taught the kids, and I think that was actually part of their inquiry learning project. You could volunteer. That would be a good thing to do anyway. A ten minute lesson one on one or maybe two on one or whatever. Get that experience. That would be a good thing to do. And make it part of an assignment or maybe just writing up a lesson plan and then teaching it and then evaluating it. Not make it a big thing but make it that everybody has to do it not just the people that nominate. They do a good thing in maths called a problem box where they make up a lesson or four lessons and they all come out of this box. So they could even have to make up a little project and they have to make up the lessons and the resources and make it moveable and then take it to the school to do that lesson [An:int:7.8.08].

Here Andrew is advocating that pre-service teachers be given real teaching practice with children as occurred when the 412 volunteers presented short teaching segments related to EfS to visiting children. Andrew saw great value in this and also in tasks which required undergraduates to prepare resources and lessons for imagined classes.

Indeed actual teaching (performance accomplishment) is considered to be one of four key factors in the development of positive teaching self-efficacy (Moseley & Utley, 2008).

Andrew appreciated the resources to which the pre-service teachers had been exposed:

Yeah um it's nice that 412 showed you the resources you can use from the internet to do projects that you can put in place with your class [An:int:7.8.08].

However he identified resource problems in his own classroom:

And maybe more on resources, where you can get things from. It's hard if you want to use the internet and you've only got one computer in your classroom. That's a bit hard. Like we were doing that work about your ecological footprint and if you've only got one computer what can you do? [An:int:7.8.08].

This example suggests that pre-service teachers need to be aware of a wide resource base, not reliant upon internet sources.

Andrew expressed a clear preference for his own learning to be through experiences, mostly out of the classroom:

Andrew: Um, boring bits were a bit more when you were doing theory work, but that's more just me.

Interviewer: So why are those [outdoor] experiences good?

Andrew: Because that's how I would prefer to learn.

Interviewer: I'm going to provoke you, but you told me that if you had more professional learning you'd like it to be in the area of programming and lesson development.

Andrew: Yeah that's the boring part. [Laugh] Caught out [An:int:7.8.08].

Ironically, most of Andrew's suggestions for improvement were about the pencil and paper task of planning for learning.

Whilst Andrew was able to offer specific practical advice for the shaping of EfS in pre-service education, Jan was able to draw on her rich experience to suggest the following:

Interviewer: With regard to EfS do you desire particular attributes from pre-service teacher education? What do you want us to do?

Jan: Just an honest and real understanding of connections with nature. I think that's the first thing. And maybe that comes from pre-service teachers having similar experiences where they go out to sites and somehow connect if they can.

And just a willingness to understand that it's a very big area, that it is an area of change; that you have to be flexible; that you're dealing with a value system and that value system can sometimes conflict with your own. And also I think to be prepared for the challenges that come with it. So for example with us, coal and tackling coal and the fact that 90% of Australia's electrical energy comes from coal fired power stations causes problems if you're in an area like the Hunter region where you're directly challenging the basis of work in those areas.

And also remembering that many of these kids are living sheltered lives in that they're not really getting out to experience even what's on the other side of the [town]. I hate to say it but it's true. So it's that sort of thing [Jan:int:6.8.08] .

As with Andrew, her remarks endorsed the inclusion of rich and diverse out-of-the-classroom experiences for undergraduates. She explained their purpose as the development of values, as helping people to make connections with the environment. She also underlined the importance of activities designed to stimulate the scrutiny and recognition of diverse societal values.

Jan's view of the well prepared new graduate included the capacity to challenge societal understandings:

Interviewer: What I'm asking you now is when a young graduate comes to the school, what attributes would you like those new graduates to have so that they can slot into what you're doing?

I think the first thing is to have quite a deep and developed understanding of sustainability in its true sense; in other words it is looking at social, economic and environmental forces and how that relates to us as an individual, as a community, a nation and from a global perspective. That's the first thing. I think at the heart of it all there needs to be an understanding of where resources come from, life cycle of products. And I think there's a deep gap there in understanding about all the things we use in our everyday life. We don't really know where they come from. We don't know the energy that's used to extract it, to make it and then get rid of it [Jan:int:6.8.08] .

Here Jan is acknowledging the complexity of sustainability issues, of what is referred to as systems thinking (Tilbury, Coleman, & Garlick, 2005). She provides an example of the kind of classroom activity that can be used to approach complexity and connectedness (life cycle analysis) and which draws on a cross disciplinary understanding of the world. Jan also believed that the well prepared new graduate should have a clear understanding of what it could mean to live sustainably. Certainly the development of improved knowledge and understanding contributing to a vision of sustainability had been one of the aspirations of the university unit.

Whilst the details of Andrew's reflections on the university unit are useful for its review, his comment on the overall impact of its existence within the BEd(Prim) suggests its essential value:

Interviewer: So if you had not done 412 would you have done environmental work once you were in school?

Andrew: I don't know. I don't think I probably would've. Like in the back of my mind I would be aware of it but I don't think I had the knowledge of the need for it to be taught or that it should also be addressed in the curriculum [An:int:7.8.08].

This remark suggests a link between the university EfS unit and the beginning teacher's developing confidence and conception of his role as teacher, in particular, his responsibility to undertake EfS in teaching. Further, it would appear that, having completed the unit, he considered that it was worthwhile:

Interviewer: Essentially I'm trying to find out is, when you came into the school is the fact that you've done 412 useful and does it fit in with the context of the school?

Jason: Oh yeah. I think it is useful and I think even if there was nothing happening in this school it would be useful to me to have that in my head and to have that motivation to develop these values and attitudes in the kids. Like even if there's no one else in the school doing it there's more benefit from just you doing it to no one doing it.

Andrew, it would appear, had at some time acquired a concern for the environment and a sense of responsibility for including that concern in his work. This positive outlook would be appreciated by Jan, who indicated that the greatest potential threat to the development of a sustainability ethic was the entry into the school of people with 'hardened attitudes', meaning people who opposed the environmental work. It is possible that the prominent inclusion of EfS in undergraduate studies is of importance primarily because it puts EfS on the teaching agenda, that it is a mandated role for all teachers in NSW, as well as showing its relevance to everyday life and to the curriculum.

7.10 In what ways does the beginning teacher engage with EfS and why?

This case has explained how and why one beginning teacher engaged with EfS. The explanations show that Andrew's teaching decisions were heavily influenced by his own interests and abilities, the context of the workplace and to some extent by EDSE

412. Andrew was able to identify that the EfS unit gave him familiarity with the dimensions of EfS and an understanding of his potential role as teacher, some confidence in his ability to deliver EfS and memorable experience of ways in which EfS could be taught. He demonstrated these understandings and skills through his ready cooperation with the school sustainability team, through his encouragement of children to behave in a caring way in the environment and through some limited integration of environment work into his teaching program. The implications of this and other cases for the question *How can pre-service teacher education better prepare beginning teachers in Education for Sustainability?* will be explored in Chapter 12.

Chapter 8: Sue

8.1 Sue at Gerula Primary

Towards the end of her final pre-service teaching year, Sue was invited to return to Gerula Primary. As pre-service teacher, she had undertaken her professional internship at this school and they welcomed her back to carry out casual work. Sue remained at this school, having been offered a position on a Year 4 class of her own, six weeks before the case study was conducted.

8.2 Context of the school

Gerula Public School has a total enrolment of well over 300 children, Kindergarten to Year 6. There are more than 13 classes with the maximum class size being 32 students. No students were using English as a second language and 17% of the students were of Indigenous origin. Most classroom teachers were within ten years of retirement. Three had less than five years teaching experience. Only some families had difficulty finding money for extra trips and events organised by the school. According to the principal the community showed limited interest in the activities of the school. Similarly the principal believed that there was no particular interest in environmental matters amongst the school community. Whilst there were parents who assisted with particular school activities such as reading groups or sport, there was no parent involvement related to environmental activity [parent:int:28.8.08 & W:int:25.8.08].

The school premises are attractive with extensive playing fields that can, however, become unsuitable for use during drought. There are many areas beautifully shaded by native eucalypts and shrubs. There are vegetable gardens, a rainwater tank and solar panels visible on one roof. Evaporative coolers and fans are used in the classrooms for cooling. Summer temperatures frequently climb above 30°C and from time to time exceed 40. The principal claimed to have no particular environment-related concerns

regarding the school, aside from the cost of water and energy including electricity and gas.

In association with rich soils, the economic base of the town in which the school is situated has long been farming, substantial amounts of which are dependent upon irrigation water. Many rural service industries are evident in the town. Currently community opinion is divided over the mining of rich coal seams in the adjacent countryside. The expansion of coal mining is seen to threaten the water supply upon which the highly productive agricultural industries depend, but is welcomed by some for the economic benefits it could bring.

8.3 School culture

As suggested by a variety of views recorded below, there appeared to be no particular consensus of opinion about what was valued in the school, no clear singular identity. The principal, Will, saw the role of the school as promoting what appeared to be the leading goals of the NSW DET:

We focus on literacy and numeracy and benchmarking, making sure we meet the needs of every single child. There are a lot of pressures on teachers today to get that curriculum across [W:int:25.8.08].

Environmental values and activities were not mentioned by any of those interviewed, as being prominent in any way. A search of the school management plan and school newsletters for the past two terms revealed no specific reference to environmental education or EfS or to environment-related projects.

Sue's supervisor, Joe, had taught at this school for over 20 years. Joe, when asked about the culture of the school, described how he believed it to be a congenial place:

Joe: It's a great school. It's just got a good feel about it and it always has had. Even though we've had times when a lot of the kids were a handful and that sort of thing, there's always been that good feel about it [J:int:26.8.08].

Lou, also a Stage 2 teacher, believed that sporting interests were not particularly important in the culture of the school but rather 'this school is trying really hard to give the kids values' [L:int:27.8.08].

Particular arrangements in the school reflecting environment related activity

However there were some arrangements reflecting environmental concern operating in the school. One was a system of paper recycling with Year 6 students taking responsibility for placing the blue bins of paper for recycling in a particular location for weekly pick up. Not all classes used the paper recycling system.

Another arrangement, well known amongst children, was the school vegetable garden. This was organised and supervised by the principal himself. Children from all grades were welcome to work in the garden during designated lunch times. This activity was greatly valued by the children, such as those in Sue's class:

Sue: Yes the garden is done by just the kids who want to do it. But there is a lot. I had them put their hands up and I think there were about 20 in my class out of 28 [S:int:25.8.08].

The vegetable gardening was viewed very positively by other teachers:

Lou: As a positive I think the boss is the main one that does the positive environmental things with the garden and just building the garden and getting the garden going [L:int:27.8.08].

No teacher assisted Will in its operation.

Will, and other teachers as well, saw the primary function of the garden as a means of dealing with children who experienced particular social problems:

Lou: He takes some of the harder children and gives them a sense of purpose and enjoyment. And some of the most hard nuts to get through to, he's got through to via the garden [L:int:27.8.08].

Lou's perception of the key purpose of the garden activity was substantiated by Will, who explained his aims for the garden activity:

One of the reasons I have a garden is that I often take kids who have behaviour issues. And we wander around there and I'm wandering around and the next minute they're following me. And they're 'Oh can I dig this or can I do that'. And the next minute they don't want to go back in the playground. They want to stay with you because they want to do something. They are doing something positive [W:int:25.8.08].

Will perceived a connection between doing something purposeful such as gardening, with positive student behaviour. The garden had been nominated as an 'environmental activity' and it is likely that children tending the garden were acquiring positive

environmental values and skills. However the gardening activity was not linked to any intentional program of environmental learning, not part of a wider program of EfS.

Another arrangement established in the school with quite strong potential for incorporating EfS was a project known as Environmental Maths. In conjunction with the local secondary school, Gerula Primary had acquired subsidiary funding to implement an Environmental Maths project for Stage 3 children. Sue was initially employed to teach this program. She created the teaching program herself, drawing heavily on ideas from EDSE 412. Her program showed that she incorporated work on ecological footprint, environmental auditing and population growth. The intention of the principal when agreeing to undertake the program was not about EfS but learning through practical activities:

I say to teachers, when we're talking about maths, and that's why we looked at that Environmental Maths, if you can make maths from a practical perspective; if you can talk about it not just as a sum on the board; if you can present it in a practical sort of way, you make it meaningful for kids. You will find that by engaging those kids in practical activities that are interesting you will reach the required outcomes [W:int:25.8.08].

Will's interest was for maths to be taught in an authentic context so that the children were more engaged and indeed the benefits of doing so are well documented (Munns, et al., 2006; Wallace, et al., 2007; Malone, 2008). Whilst Sue had the background that allowed her to incorporate such EfS concepts and skills into the program, EfS concepts were not continued in Environmental Maths, when, after two terms Sue was given a Year 4 class of her own. The teacher who taught Environmental Maths, after Sue had been transferred to Year 4, interpreted Environmental Maths as measurement of perimeter and area outdoors, compass work and mapping. His teaching program showed that his interpretation fell equally well within the principal's intent in establishing the project. Only the more able mathematicians in Stage 3 attended Environmental Maths classes. This left the remaining students to work with their class teachers. The Year 6 class teacher reported that she saw this arrangement primarily as an excellent opportunity to drill mathematics with less able students, thus orienting their work to the anticipated national mathematics test (NAPLAN). It would appear that, whilst the Environmental Maths project had potential for infusing EfS into the culture of the school, the opportunity to do so was not developed nor particularly valued, beyond the initial effort made by Sue.

The discussion to this point indicates that although there appeared to be no particular emphasis in the school on environmental education or EfS, there were some opportunities existing in the school for environmental learning to take place, albeit opportunities which appear primarily to have been initiated for purposes other than EfS. The next section provides some insights into the seemingly limited manner in which environment related work was incorporated into the everyday curriculum of the school.

Education for Sustainability and everyday curriculum

The pressure for students to meet outcomes and to perform well in NAPLAN testing was mentioned by several teachers. From Sue's supervisor, Joe, came the remark:

And it's thrown up at us a thousand times. We've just got to work smarter. We've got to use our time better. But you can't when you've got six KLAs and the push is always there to get better results in English. Get the kids to read better, write more. They should be spelling better, doing more maths [J:int:26.8.08].

As a means of ensuring that teachers were working to KLA outcomes, a planned scope and sequence of teaching content had been prepared. Teachers routinely met in stage teams to contribute to planning and to coordinate implementation. As is common in NSW schools, there was a scope and sequence for science and social science topics. However the organisation of curriculum went deeper than that. In particular, in a discussion about spelling:

Interviewer: Where do your words come from?

Sue: We've got a book like a textbook. The whole school uses the same one so we're all supposed to follow it. We get all the activities and the words from the lists in the book. [Su:int:26.8.08].

Similarly a commercial kit was used for the teaching of science across the grades. Sue liked the resources that came with the commercial science kit. Lou, a Stage 2 teacher who had been working in the school for six years, was unhappy, describing the impact of the scope and sequence planning as follows:

Lou: The science is restricted. It's really structured and it's other teachers that put the pressure on you too to make sure that you've taught the unit before, or that you don't cross into the unit that they have. That you don't deal with the planets before they get into Year 5 when we're going to deal with the planets.

So if something comes up and the kids are all motivated and you're really going down some track then suddenly you're treading on other people's toes.

I would rather do it the old integrated way where you did environment and then you wrote your text types from it, you did your research from it, you did your maths, Environmental Maths. Like bring it all together.

Now you feel like you can only do maths for this long and then have to stop and then do English for this long and then I have to stop, then I have to do this. You've got to go along by timetable and you strictly adhere to the timetable and the numbers of minutes and hours in that timetable. At one stage your supervisor would actually come in and check that you're actually teaching maths at the time it was timetabled.

Interviewer: Why has this happened?

Lou: I think it's only really happened recently to make sure that people do the work. It's like an undermining of the value of teachers making decisions for themselves. It's like checking up that you're actually doing the maths and you're actually covering what you say you're covering [L:int:27.8.08].

Lou was expressing her frustration with the manner in which curriculum was being organised in the school. Her remarks however also show that in the absence of centrally programmed EfS, it could be challenging for teachers to implement EfS with their own classes, because of the competing demands of a quite prescriptive curriculum timetabled the way it was. Lou's comments were echoed by other teachers such as Debbie, a Year 6 teacher, who believed that there was little environmental education in the school because of the pressure for children to perform in English and mathematics. Similarly, Nancy, a Year 6 teacher and Assistant Principal, saw that the scope and sequencing of work in each KLA fragmented curriculum and made integration difficult [N:conv.notes 27.8.08]. These were exactly the problems raised by Walker (1995) and Stevenson (1987, 2007). Nancy identified that there was a need to have children in class drilling basic material, because of the requirement to have them meet standards in national testing. She observed that the whole school focus on text types, which saw every teacher teaching specific text types at particular times and submitting the children's work weekly for scrutiny by the principal, as having the effect of greatly improving written skills. Ironically, she reported that spelling and grammar scores simultaneously were lower across the cohort [N:conv.notes 27.8.08].

The above remarks confirm that curriculum priorities of the school did not lie with EfS. The views and actions of the principal and how those views influenced the nature

of EfS in the school are explored in the following section. The views of the principal are relevant because of their influence in shaping the context in which the beginning teacher works (Kagan, 1992; Walker, 1997a).

Environment related views of the principal

Will had a broad understanding of EfS. Evidence is gathered below to show that he did not act upon his espoused understanding beyond organising the vegetable garden and thinking about energy and water use at an executive level.

Will hinted that a benefit from gardening was the development of an affinity with environment ('it's a living thing and they make that connection with the earth' [W:int:25.8.08]). This is about education *in* the environment which is thought to be of fundamental importance in development of an ethic of care (Sobel, 1996; Fien, 2003). Will was interested in developing a sense of relevance and connection for all children, making the gardening activity freely available to any student who wished to be there.

Will however also conceived of EfS in a broader sense. In particular he was acutely aware of the significance for the people and for the school of the mining proposals that were being pursued in the region:

Will: [The mining company] came to the schools saying "We've got \$5m. What do your schools need? What are your community needs?"

Interviewer: So have they funded anything here?

Will: Yes. I went to a Parents and Citizens' meeting a little while ago and I said, "How far do you want to go with this?" Because our kids wanted to travel to [a musical performance]. And the cost of sending our kids to anywhere is astronomical. And so the teachers applied and we got funding from [the mining company] for the bus to go.

And when we look at education in the school we have to have a balanced perspective. They talk about how the mineral boom with coal is driving our economy, maintaining our standard of living and then on the other side what sustains us and what is the long term impact? So at school we've got to provide the information and let people, let kids make informed judgments on it. And we talk about that in terms of quality teaching and presenting an inquiry process and saying "Well what would happen if such and such?" and let the kids research about it [W:int:25.8.08].

In suggesting that children should be given, through inquiry learning, the capacity to make informed judgments, Will was voicing the need for a critical approach and this

is central to EfS (see for example Jensen, 2002; Huckle, 2005b). He appeared to recognise, as did Fien (2003) and Gruenewald (2003), that both connecting with the Earth and adopting a critical approach are essential in EfS, and that neither is of itself sufficient, if a cultural shift in favour of sustainability is to occur.

Will himself investigated sustainability issues in the school:

The first thing we looked at was water usage. We replaced all the taps with spring taps so they couldn't be left on and we replaced all our toilets with dual flush [W:int:25.8.08].

Additionally particular staff members felt some degree of ownership of sustainability initiatives. Joe, Sue's supervisor, for example was aware of the solar panels on the roof:

Interviewer: Are there any initiatives with regard to energy reduction?

Joe: We've looked at several initiatives. You will have noticed the solar grid on top of the roof. That was an initiative to use solar power and sell it into the grid. It's been there a long time. Again it's lost its impetus. And I think it was last year that Will actually said, "Is this thing still working? Are we getting any benefit?" because it just became on the roof and no one knew if it was working [J:int:26.8.08].

Joe spoke of the consideration of energy reduction initiatives in a collective way. As a senior member of staff he had some involvement, but students were not mentioned. There was no SEMP and students were not engaged in processes of critical inquiry which Will understood and could have encouraged. Will described minimal student contribution to environmental decision making [W:int:25.8.08].

Despite the principal's understanding of EfS, and his recognition of its importance in the lives of the children at the school, he did not appear to be acting on that espoused understanding beyond conducting the gardening activity. Additionally, despite the presence of facilities such as solar panels and rainwater tanks there was little indication of their incorporation into curriculum and no widespread culture of sustainability in evidence. Casual conversation with Year 6 students revealed that some knew about the presence of the solar panels on the roof but others did not. The blue bins for paper recycling were provided and teachers were told about them, but they were used by classes on a voluntary basis. From Will came the remark:

But we haven't had a plan to say this is part of our program. I think you throw out your different things: like with the garden, we developed that and it's there. If you want to use it you can. This is the recycling and the bins are here if you want to do it [W:int:25.8.08].

The social organisation required to infuse the use of these facilities throughout the school appeared to be minimal or absent. A beginning teacher could choose to use the recycling system or ignore it. There was no suggestion from the principal that engaging students in inquiry surrounding sustainability should be a part of the beginning teacher's work.

Will's efforts in the vegetable garden were considerable, requiring planning and determination to set aside the designated lunch times. It seemed however that the principal's expressed desires for the school to offer more education *in* the environment and indeed to provide the opportunity for students to understand the complex situation of the region's pressing environmental concerns were frustrated in particular ways. These frustrations included lack of support from the employer (NSW DET); perceived inevitability of failure of a SEMP; and unpreparedness of teachers.

Firstly, this principal like all others in the NSW DET was repeatedly exposed to sessions where schools' progress in terms of national testing of literacy and numeracy was prioritised. From this he perceived that there was little support for EfS from the state schools' hierarchy: '... when they put up new buildings they don't look at sustainability; ... they don't talk about sustainability in new syllabus documents' [W:int:25.8.08]. From Will's point of view of his responsibilities as principal, there was little reason for him to pursue environmental sustainability, apart from for the purposes of reducing expenses. This was particularly the case given his perception that his employer exhibited inconsistency: on the one hand promoting a policy of EfS and on the other hand provisioning schools in an unsustainable way, excluding sustainability from core syllabus documents such as science and not requiring principals to be accountable for the mandated policy on the environment.

Will had more arguments to support his laissez-faire position on EfS. He was clearly aware of the NSW DET *Policy* (2001a) and understood the need for children to be

able to make informed judgments but he saw as an impediment a general lack of teacher interest:

It's always been one where if a teacher has a particular interest or skill in a particular area then they tend to run with that, more as an isolated component.

This substantiates a similar claim by Tilbury, Coleman and Garlick (2005). Will continued, saying:

I think that now educating kids in sustainability is a whole new program and a whole new emphasis. And it is a difficult one because our teachers, our current teachers, haven't really any expertise. Before it came down to someone had an interest in the garden so they go on with the environment. Basically that. But there are bigger issues now [W:int:25.8.08].

Will was well aware of the bigger issues and the nature of contemporary EfS, but it appeared that he perceived himself to be caught in a situation, derived from the past, where environmental education was pursued by those with a particular interest, and in this school, that was primarily himself. As he saw it, the reason for the inactivity of teachers in the school was their lack of expertise and particular interest.

It would appear that, given this state of affairs, Will was unprepared to raise and encourage an EfS agenda. In some ways, it seemed, he was resigned to the general lack of interest, not wanting to set up a school plan, and finding further reason for the current situation to continue:

Interviewer: We have a policy in NSW and the requirement for an environment plan. It's interesting to me to talk to you and hear a different perspective.

Will: Well I've seen schools that have excellence in environmental education. A person has come along and really had a focus on environment. They have gone and then it's finished. It was driven by their enthusiasm and their interest in it. But unless it's something that improves the capacity of the school by developing that interest in others then you're not going to get that to stick. You're not going to get interest by asking your teachers to use another policy or by developing a set of procedures that they've got to do. It's got to be a natural living enjoyable thing [W:int:25.8.08].

Will appeared to be finding reason to avoid committing greater effort to EfS, by reiterating reasons why it may be short lived in the school; by rejecting the SEMP as a vehicle for change ('but it [the SEMP] is not that easy' [W:int:25.8.08]) and by rejecting the notion that something would happen simply because it was 'mandatory'. The implications of this principal's outlook are that the beginning teacher entering the school with interest and expertise in EfS would find little by way of support for EfS

operating in the school and would not necessarily perceive EfS procedures and skills as being valued or that such skills should be employed. The net result of the decisions made by Will in the context within which he worked, was that there was no whole school culture of sustainability. This in effect was a limitation on what was discussed in the school and on what Sue could aspire to achieve.

Environment related views of other teachers in the school

Work in EfS by established members of staff could be a great encouragement to the beginning teacher should she be interested in pursuing a similar pathway (Wang, Odell & Schwille, 2008). Will and Sue both identified two teachers as having an environment interest.

Evan, a Year 2 teacher was concerned that his students should understand their dependence on the environment and have the skills that would enable them to conserve the environment in future years [E:int:27.8.08]. At Year 2 level he was building a foundation for the development of student capacity in thinking about the environment, as shown in his description of a class activity:

They had to make a catchment area on the tar just with sand. They had to make a river, then we had these straws for the pipes, as with the irrigation around here. They lay the pipes in then the vegetation, and then show where the water goes. So it builds that understanding of catchment [E:int:27.8.08].

Here Evan was describing how he helped children to develop a practical understanding of water, where water came from and how it was used in the local district. In doing this he was responding to what he identified as a threat to the existing way of life of the local people: ‘In 50 years time we’re not worried about coal, we’re worried about food’ [E:int:27.8.08].

Another teacher interested in EfS was Lou. Lou was reflecting on the essence of EfS when she commented on Evan’s work:

Lou: Evan has a passion for science and everybody knows that. It doesn’t matter what’s written he’ll just push through and do his stuff. And the kids carry it with them. I have his kids after him and they carry this passion with them for science and environment. They just need to be able to write and do the other stuff as well. So there’s this balance that you’ve got to get. But that passion is what it’s all about. And global warming and all of that. And being really able to

understand it without fear... that's one of the things we have to get across is to not frighten people but to enable [L:int:27.8.08].

It has been recognised elsewhere that simply teaching about environmental problems can be counterproductive in EfS in the sense that it can cause 'action paralysis' meaning to negatively affect the desire to act in a positive way (Connell et al., 1998; Fien, 2000). Lou was aware of this, of the importance of enabling young people to deal with the environmental issues of their day and of developing their interest in doing so.

Lou herself expressed interest in the critical aspects of EfS and chose to incorporate this into her literacy program:

Lou: This book is environmental. We just read it this morning. It gets to a point where it asks kids questions so that they express opinions.

And the kids love it and they all have an opinion and they all like to give it. These ideas I sort of cover indirectly but the actual practical doing something like rebuilding a native garden I don't have time for. I cover this sort of stuff through reading this book and discussing it to start the day off, which gets them interested and able to think, which is so important [L:int:27.8.08].

Lou had a broad conception of EfS and a desire to develop particular skills and attitudes with her students. She was overwhelmed however by the large number of students in her class, specific management problems associated with particular children, the inadequate building assigned to her, and the competing demands of curriculum [L:int:27.8.08].

Although Sue was able to identify Evan and Lou as teachers with an interest in environment, she had little contact with them. She explained how in this large primary school, Evan worked in the Stage 1 area which was physically separate from Sue's area. Similarly, Sue had only recently been allocated to a Stage 2 class and thereby had only recently come into contact with Lou. At this early stage, closer connections based on an environmental interest had not been formed.

Maybe, as with Joe, Sue's supervisor, there were teachers in the school who were happy with their lot and did not feel prompted to change. Indeed Joe, who would be influential on Sue's thinking, in a way described by Cherubini (2008), had no

particular concerns about the issue of climate change, which at the time was the subject of endless press reporting and public debate:

Interviewer: Do you worry about the carbon emissions and the climate change aspect of coal?

Joe: I don't know if I'm sticking my head in the sand, in that I think it must be affecting the atmosphere with the carbon emissions, but I tend to think it's not going to change anything for years. And as such I think by the time anything really drastic does come around: I know it's not going to be an overnight thing all of a sudden the sun'll fall out of the sky or something, but I think they'll have solutions. There'll be other ways around it. Or the whole direction people are taking with energy will change course and it won't become an issue any more [Joe:int:26.8.08].

Future thinking and education that helped children cope with change was not on Joe's horizon. For Joe, education was much as it always had been and would continue to be so. Sue, as beginning teacher, was unlikely to find particular encouragement for EfS activity from her supervisor.

The section above has described aspects of the culture of the school which may be influential on the capacity and desire of the beginning teacher to engage with EfS. There were some arrangements in place to encourage students to act *in* the environment and *for* the environment. Apart from particular requirements as described, teachers were free to incorporate environment related learning into their teaching, but interest did not appear to be strong and a change towards sustainability or improved teaching in sustainability did not appear to be on the agenda. Some teachers were actively including EfS in their teaching but in an isolated manner. The sections below describe how the beginning teacher responded in this situation, but first there is a brief analysis of what understandings and values Sue brought to the school as a new teacher.

8.4 Sue's views of EfS as pre-service teacher.

Motivation and intention

Survey results show that, as pre-service teacher, Sue began the environment unit rating her desire to include EfS in her teaching as 'strong' because she believed that 'conservation is essential for everyone to have a future' (T1). In Survey B she again rated her desire to include EfS in her teaching as 'strong' with her reason being that

the environment unit had ‘made me realise the importance of EfS’ (T2). Furthermore she believed at T2, that she felt ‘more knowledgeable and passionate, as before I did know there were issues, but I did not understand the extent of some issues or their effect on us [Su:urv:T2]. The above survey and Interview A remarks from Sue suggest that at the end of the unit, although she used the same ranking for motivation as at the beginning, her understanding of environmental issues and the significance of EfS had deepened, as had her implied determination to include it in her work.

Sue also acknowledged the influence of earlier experiences, in particular, of travelling and of the environmental outlook of her father on her motivation to engage with EfS [Su:int:T2]. This is consistent with the findings of Palmer et al. (1999) and Bogelhoz (2006). The significance of this is that she had held an interest in caring for the environment over an extended period, increasing the likelihood that her positive valuing of the environment would continue (Pajares, 1992).

Sue attributed her engagement with EfS to her own fascination with the new information that she had gained from the university unit. Her main motivation, as with Evan, but in contrast to Joe, stemmed from concern for the future:

Sue: I’m finding my biggest motivation. I feel like it’s our responsibility to teach younger people for the future. I mean Education for Sustainability is good in that way because we’re looking at how we should be sustaining the Earth [Su:int:T2].

It was evident that concern for the future was an important issue to Sue:

Some of my friends ... clearly don’t have the understanding and they’re just like, ‘Oh no, whatever,’ and they’re not worried about recycling, they’re not worried about spending 20 minutes in the shower, but I am [Su:int:T2].

Sue’s developing personal interest in the environment, the information that she was learning and her understanding of the significance of this information fuelled her intentions:

I’m finding that through this unit I understand more about the problems. Sure I knew there was global warming. I knew there were drought issues. I didn’t understand the extent, how important they are to everything, like the ecological systems to everything. But yeah, now I understand more so I want to do more [Su:int:T2].

Supporting the notion of her positive intent, survey results also show that Sue strongly believed that as a teacher she had an important role to play in solving environmental problems.

When asked what might diminish her engagement, Sue referred to evidence of a lack of EfS in existing practice. This view was based on what she had observed in schools. She had found that ‘not a lot of people are interested’ [Su:int:T2]. Despite her strong concern for the environment, as indicated in interview and survey responses, and also through the social actions she had performed during the EfS unit regarding water auditing and change of water related practices in her household, Sue recognised that the practices and attitudes of others could compromise what she would be able to accomplish in schools.

Confidence

Survey ratings indicate that Sue initially felt ‘confident’ (T1) to include EfS and this rating remained the same at the end of the unit (T2). Initially she explained her level of confidence by saying that ‘I need more knowledge in the area of sustainability and how to educate people’ (T1). In T2, although she had not altered her rating on confidence, her statement suggests an improvement: ‘I understand now ways to implement activities, where to locate resources and how to use them’ (T2).

Given that feelings of confidence in beginning teachers are associated with positive outlook and achievement in teaching (Hoy, 2000), self confidence of participants, and what contributed to this in relation to EfS, is significant. As reported, both interview and survey data indicated that Sue felt confident to undertake EfS on the basis of strategies and resources with which she had become familiar. For Sue, however, a feeling of confidence did not apply to all of the aspects of EfS that had been presented in the unit. Consistent with the findings of others (Lane, et al., 1995; Tschannen-Moran & Hoy, 2001), she could identify specific topics (in science and in maths), and strategies (such as using Jensen’s model of action competence in programming), with which she did not feel confident. Also she was able to anticipate that her overall confidence would be diminished in a school where the principal and head teachers were disinterested in EfS.

In summary, at the completion of her university studies, Sue's intentions to include EfS in her work were positive. Optimism from such a finding must be tempered by Wang et al.'s (2008) remark that surveying and interviewing beginning teachers (and by implication, pre-service teachers) about their feelings does not capture what beginning teachers are actually able to do in their classrooms.

Sue's feelings of confidence were fostered by knowledge of content, teaching strategies and resources for the classroom [Su:int:T2]. Whilst Sue expressed positive self-confidence in aspects of EfS, and the importance of this for teaching success is acknowledged (Wang, Odell & Schwille, 2008), others have shown that beginning teacher experiences can lead to diminished confidence (Woolfolk Hoy, 2000). The following section explores Sue's perception of the culture of this school, in which, at the time of interview, she had been working (internship included) for a little over one year.

8.5 Sue's perspective: school culture

Consistent with remarks by Will and Joe, Sue perceived that, with few exceptions, the general attitude of adults in the school was one of disinterest in environmental matters. When asked about the topics of conversation in the staffroom, she replied:

Sue: But generally to go in there and start up a conversation about something environmental, it probably wouldn't go far.

Interviewer: Why is that?

Sue: Disinterest. Or just that something else is a far more important thing, like sport. The other teachers don't sort of know what global warming is or discuss it too much or anything else. It's very limited.

Sue was able to suggest a number of reasons why, in her view, disinterest prevailed. She saw other members of staff as being 'an older group', entrenched in the business of their families, not looking at the world beyond the local community and focused more on retirement [Su:int:26.8.08]. Lack of professional conversation in staffrooms has been described elsewhere by Cherubini (2008), who reported that practicum students perceived:

For the most part, professional dialogue did not encourage conditions and connections to improve teaching practice and further student learning. Instead

the discourse was situated in managerial issues, organisational incongruities, and problematic student behavior (Cherubini, 2008:47).

Cherubini (2008) argues that such conversations potentially stifle productivity and professional development. Certainly Sue's remark that the conversation was 'very limited' suggests that she was not impressed.

Sue also appeared to be sensitive to the possibility that pressing local environmental issues, which were dividing the wider community and potentially the staff, were generally avoided:

Sue: Say if you were to bring up about the mines. I don't know but I'm pretty sure a couple of the teachers here, their husbands work in the mines. So obviously they'd be all for the mines because of the finance it's bringing in, but I think we've got one teacher on staff who lives on a farm. So his view is going to be quite different because he's going to have to protect it when they come and try to take it over. So I don't think it's an issue that's been brought up [Su:int:27.8.08].

In this way Sue described in the culture of the school, not just an apparent disinterest but also a silence, perhaps fuelled by an unwillingness to disrupt the existing levels of harmony of everyday school business:

Interviewer: So what are you suggesting about the culture of the school?

Sue: It's very, very localized.

Interviewer: And what about attitudes?

Sue: I wouldn't say there's a negative attitude towards it [environment] but there's not an interest. With most people. Or if there is an interest it's kept quiet and you don't realise there is an interest in the area [Su:int:27.8.08].

Additionally, Sue was able to identify executive decisions that marginalised EfS. Her observations were consistent with the situation already reported by Will and Joe. In particular she volunteered that environment was 'not a whole school thing' [Su:int:27.8.08] and also that there were limited opportunities for children to contribute to decision making [Su:int:27.8.08].

Other management decisions that marginalised EfS related to curriculum. As mentioned, a sequence of topics that teachers should follow for science and social science had been prepared. Sue had the freedom to teach the assigned topics in a

manner of her own choosing, but she none-the-less felt restricted in what she could do.

Interviewer: Is there a scope and sequence for the school for HSIE and science?

Sue: Yes. There's a scope and sequence for everything actually, every KLA.

Interviewer: And you pretty well have to follow that?

Sue: Yeah

Interviewer: So how free do you feel with regard to actually incorporating it [environmental work] into your teaching?

Sue: Not free at all. It's very locked in, what should be taught. And not so much when, but we're on a two year cycle so there is not a lot of room to move in amongst it [Su:int:26.8.08].

As described by Lou, the topics to be studied were prescribed. There was no requirement from the school administration for EfS to be addressed within those topics, leaving teachers free to ignore it if they chose. It would appear from Sue's comments above that ignoring EfS would be easy, given the pressure to cover particular topics in the scope and sequence and given the emphasis on prioritised outcomes. As did Lou, she felt pressured and constrained by the school's priorities:

Sue: But it's also the time for making sure that you're getting through the maths or the English or whatever it is we're supposed to get through every day. Because you are constantly being checked, 'are you doing everything in your program and are you achieving every outcome?' [Su:int:26.8.08].

As an early career teacher Sue was sensitive to the anxieties of school executives regarding the school's performance in the national testing program. This added pressure, typical of western culture schools (see for example Gruenewald, 2003; Gruenewald & Manteaw, 2007; McLeod, 2007; Stevenson, 2007) was further indication of the direction in which the school's priorities lay and the disinterest of the executive regarding EfS.

Sue was aware also of the school's underlying intentions with the Stage 3 Environmental Maths program as previously described by Will, and how those intentions were not particularly related to EfS:

Interviewer: Why do you think they nominated for year 6 to do Environmental Maths?

Sue: The principal at the high school actually got the funding. And the big people in Sydney said “Come up with a new idea,” because they were finding the kids from our school that got to the high school in Year 7 were really bad at maths. So find a new way of engaging them in maths. And he thought with all the things happening in the environment, maths and the environment would be great. And that’s where that came from.

But I don’t know if maybe it should have been titled “Maths in the Environment” rather than “Environmental Maths”. Because they have two different meanings really [Su:int:26.8.08].

This final remark indicates that Sue was well aware that EfS was far more than just working outdoors *in* the environment and that ‘maths in the environment’ fell short of her broader conception of EfS.

Fresh from her university education, Sue saw the Environmental Maths program as an opportunity to focus on environment, but found the organisation and once again the low priority placed on the Environmental Maths program to be frustrating:

Sue: I only had the maths groups for 45 minutes. Having a lesson for 45 minutes with one group of kids: a lot of it you can’t fit in. Some of it [EfS] needs to be done continuously and because they’re not my class I couldn’t do that [Su:int:26.8.08].

Interviewer: Is it hard to develop the concepts if you’re just doing the maths?

Sue: Yeah, that was it. I was just doing the maths [Su:int:26.8.08].

These remarks suggest that Sue was experiencing a kind of ‘truncated’ environmental teaching, meaning difficulty in developing children’s understanding because there was no opportunity to teach the topics through KLAs other than maths. Her frustration with trying to do environmental work through just one KLA represents support for EfS taught in an across-curriculum or holistic way as is frequently advocated (Tilbury, 1995; ADEH, 2005). Additionally her work was limited by the timetable. If a staff member was absent for the day, Sue was allocated to that class and the Environmental Maths program temporarily abandoned. Once again there appeared to be little value placed on the environmental work that Sue had been undertaking.

Sue’s overall perception of the culture of the school in relation to EfS is revealed in her following remarks:

Interviewer: So how would you describe your support base for EfS?

Sue: I wouldn’t say it’s strong [Su:int:26.8.08].

School culture refers to ‘prevailing norms and patterns of interaction that exist within the school’ and fundamental to school culture are ‘the underlying attitudes and expectations demonstrated by teachers [and these] have a profound impact on morale’ (Cherubini, 2008:40). Following is an example of the point being made by Cherubini (2008), wherein altogether the culture of the school appeared to add to a sense of frustration, perhaps disappointment for Sue:

Sue: But I find that it’s very hard in a school so big. They [the teachers] don’t really want to come on board with it. Like they’re conscious of turning lights off and things like that but they’re not trying to bring anything into the classroom about global warming or about water usage and things like that. So it’s sort of like what I can do in my room is sort of: the end [Su:int:26.8.08].

In contrast to the general disinterest of adults in the school community, Sue found the children to be both curious and concerned about environmental matters. As mentioned previously, in her pre-service year, Sue claimed a great deal of personal interest in social science, travel and the affairs of the world in general [Su:int:T2]. She brought this interest into her classroom, encouraging the children every day to report on news events they had heard. She used the children’s various interests and their reports on the news to initiate discussion. Often their interests were stimulated by factual texts about the world that she chose to have in her classroom, for the purpose of enticing them to read.

Sue gave the example of children’s interest in the impact of global warming on the poles:

We had a man come and talk to us about Antarctica. He’d lived there. Fascinated. They wanted to know everything about it for the next week. And why is it melting and why are the polar bears going to drown and things like that [Su:int:26.8.08].

Additionally, Year 4 children were enthusiastic about their gardening activities with the principal:

But I know that with three quarters of them having their garden, they value the garden, what they’re growing here at school [Su:int:26.8.08].

Sue claimed that Stage 3 maths children were shocked with the outcome of their ecological footprint calculations. Their response was encouraging:

Sue: I know that they formed an interest after the ecological footprint calculation, where 'I'm actually using 3 Earth's of produce' and things like that. How can I try and fix it? So they were interested in what things they could do to try and lower it. So they had the value of thinking: 'there's a problem. I should try and fix it somehow' [Su:int:26.8.08].

Sue was very much aware of the interest and willingness of the children to be actively engaged in positive action for the environment. The positive responses of children are significant in shaping teaching decisions (Hargreaves, 1998) and could encourage Sue to continue with environment-related work. She also recognised that the physical environment of the school had much to offer in terms of resources for environmental work:

Sue: The resources we have got are good. Like the garden is excellent. If you actually spend enough time out there looking you can find bugs and things like that. I think the size of the school. Because we have fields, we have koalas wandering through, we get the birds. So we have got natural things happening. And it's not a problem if you do want to take the kids just outside the school. I think the diverse range of plants we've got. We have got a diverse range if you stop to notice them [Su:int:26.8.08].

And Sue clearly had. From Sue's perspective there were elements of school culture that frustrated her efforts, but she was quick to identify the enthusiasm of children and the physical environment as positives for EfS.

This was the nature of Sue's work situation. There was consistency between Sue's perception of the school culture and the remarks of others. The following two sections deal firstly with her motivation to carry on with EfS and then her teaching response.

8.6 Sue's perspective: personal motivation

Given this situation, it is hardly surprising that Sue responded to questions about motivation in the following manner:

Interviewer: Do you think you feel more motivated or less to include EfS than you did a year ago? Rank 1 to 10 where 10 is lots.

Sue: I think a four. I think I was more passionate while I was at uni learning about it. And then when I came into this context where it's not a big focus. It's sort of: you start to lose the drive a bit here [Su:int:26.8.08].

Lack of enthusiasm, even interest, amongst those around her was taking a toll on her desire to carry EfS forward in the school. As an undergraduate, Sue had predicted that

if anything were to undermine her desire to pursue EfS, it would be the attitude of others in the school and this report has proven her prediction correct. She had made that early remark on the basis of her observation of practicum schools. The importance of finding practicum schools that demonstrate good EfS practice has been noted (Ballantyne, 1995; Oulten & Scott, 1995). It is likely that practicum experiences that illustrated good EfS practice could be very encouraging for early career teachers.

There was a different and competing agenda in the school, an agenda from which the issues of sustainable living were all but absent, or as Sue phrased it, 'It's not a pushed issue'. [Su:int:26.8.08]. In addition the practical issues of outdoor work in a busy schedule compromised her desire to continue with it.

Sue: I also find it's very hard trying to fit in everything we're expected to fit in a day or a week. With the time we've got and then we've got so many interruptions. I mean I did take my Year 4 kids out for one Environmental Maths session just to get them outside and look at buildings and things. But then it took so much time getting them to the destination and then getting them to settle, because it was a new environment, then getting them back and settling again [Su:int:26.8.08].

None-the-less, at this same time (T4) when Sue completed Survey C, she described her desire to include EfS in her work as 'strong', stating that understanding of sustainability 'was an important part of everyday life'. When at T4, Sue was asked how much of her concern for the environment she felt she could or should convey to her students, she replied:

I think if I really tried to, it would be quite a lot. I mean when you see things on TV like the polar bears, we're losing the ice caps. That makes me really upset. And that drives me to be more passionate. So then it makes me think we really need to do more. And to do more we need to get kids to understand why [Su:int:26.8.08].

Sue was concerned for the future. She was aware of the connection between the everyday decisions of the present and their impact on the future and importantly she was motivated by the understanding that she could act upon this concern through her teaching role.

8.7 How did Sue respond in this context and why?

There was no doubt about how much Sue was valued at Gerula Primary, given that she was invited to teach there after a successful internship in the school. Sue held the Stage 3 Environmental Maths position until she was offered a permanent position and a Year 4 class of her own. The significance of these varied roles is that in the following description of what Sue does, there is reference to her activity across a number of classes.

Sue applied herself to her job in a conscientious manner, using time before and after school and at weekends to improve her own knowledge through reading, and to seek out interesting activities for her class [Su:int:24.8.08]. When she was asked to teach Stage 3 Environmental Maths, her response was as follows:

Well I pulled out all my uni stuff and I was really glad I hadn't thrown it out. And I started pulling things out and I'd think, 'Oh I remember when I did that last year, how can I make that for year 6 or year 5?' So uni work actually ended up being very useful in that area. But when you get on to the internet there's nothing there [Su:int:24.8.08].

The fact that Sue was the kind of person who kept her notes from pre-service years and used them for later reference suggests her conscientious nature but it also suggests that she valued the work that she had done in the EfS unit, thinking it worth keeping for later use. In addition, her experience of EfS at university gave her a broad understanding of what 'Environmental Maths' could mean and may have influenced her choice of topic as can be seen in Table 8.1.

Sue described some of the Environmental Maths work (Table 8.1) with her Stage 3 classes:

Sue: We did all sorts of things. Looking at power usage and water. I actually had taps with buckets under them. We did a water audit. Left a stop watch with them. Then we came back and we tested and we graphed and we looked at how much water they wasted. The kids were fascinated to think, because I had them multiply it by 24 hours, how much water we had lost [Su:int:26.8.08].

She organised children to do far more than calculations, asking them questions about the significance of their findings. As an example:

Sue: We went out into the playground and we looked at trees, how to measure the growth of the tree. And we tried to assess, if a tree is that high now, in ten

years what might happen, what if it doesn't get water: like all the things that make it grow [Su:int:26.8.08].

Table 8.1: Environmental Maths (overview) copied from Sue's teaching program.

Week	Topic/area of study	Commentary by Sue from Interview 27.8.08
1	Population and growth: animals	
2	Population and growth: human populations	We looked at Australian population, countries of birth of people living in Australia. So we discussed why they would leave their countries. Kids came up with a lot of good ideas too such as there's war and then they can't get food any more or the tsunami [Su:int: 27.8.08]
3	Population and growth: plants	
4	Audits: water	I had taps dripping and buckets beneath so we could measure the water lost. [Su:int: 27.8.08]
5	Audits: food waste	
6	Audits: energy	All the kids were asked to bring in power bills [Su:int: 27.8.08]
7	Global responsibility: greenhouse gases	
8	Global responsibility: ecological footprint	
9	Global responsibility: global life expectancy	

She saw the Environmental Maths task as an opportunity for the practical application of EfS and for developing children's interest in the interconnectedness of life, as for example, between weather and plant growth; between plants in the school yard, the nearby nature reserve and the visiting koalas; between dripping taps and the broader water based issues of the region. Sue understood how to make mathematics relevant to children's lives through the lens of EfS. These particular skills were not necessarily known to other teachers who did not appear to use them [Su:int:26.8.08]. As mentioned above, Sue's interpretation of Environmental Maths was quite different from that of the following teacher who later took the Environmental Maths role, because Sue was able to add to mathematics a dimension of significance regarding environmental connections. It could be that she interpreted Environmental Maths in this way partly because of her interest in the world around her. Another reason may have been that she had undertaken a unit in EfS at the university from which she was able to extract some usable activity ideas as well as a broad understanding of what EfS could be about.

Sue used opportunities that arose to add to children's knowledge of the environment:

Interviewer: So EfS is not written into here [Sue's program] but are you telling me that it comes out in the way you run your classroom and in discussions?

Sue: A lot yeah. It tends to come up in discussion. It's not formalised, it's not programmed but it sort of does come up. Normally if something comes up on the news one student will report on it. And the other kids will say "Oh why does that happen?" It is talked about but it's not formal.

Interviewer: So their interest initiates the discussion?

Sue: Yeah. And then there's lots more questions and sometimes I set it as a computer task. Go and look it up. Find out why [Su:int:26.8.08].

Sue identified that there was a particular language of environmental sustainability that could be developed by such discussions:

Interviewer: When you engage your children in EfS, what's the most important thing for you to develop and why?

Sue: Trying to develop their understanding but trying to make it, because they're little, trying to make it at a level that they can understand. Sometimes it includes changing some of the language we use so that they can understand it better and also just wanting to get them to be involved.

Interviewer: What do you mean by changing the language?

Sue: Trying to just get them used to those terms like carbon emissions and things like that that we don't see all the time [Su:int:26.8.08].

She facilitated the discussions with the intention of developing children's understandings. She realised that not only would the discussions facilitate language development but also development of children's interest in the environment.

In her selection of children's literature to present to her class, Sue sometimes chose texts that provided knowledge of the environment and that posed positive environmental values. An example was the selection of a narrative about a fairy penguin embroiled in an oil spill event, trapped and subsequently liberated by local children:

Interviewer: Am I noticing that you're using *Pinquot*?

Sue: Yes we have been.

Interviewer: So is that the story you're reading them?

Sue: Yes that's what I'm reading them, just as something to get them to listen. They are enjoying it a lot.

Interviewer: And the kids have written these things?

Sue: Yes I asked them to write a profile of the different characters and they did it [Su:int:26.8.08].

Sue's remarks are about how she integrated the text with its environmental theme into her English program. As with the discussions described above, this was not programmed EfS, but rather as EfS content integrated into the English program. It served the purpose of adding to environmental knowledge and the characters in the children's novel demonstrated positive environmental values and actions.

When Sue was asked about whether or not she had encouraged children to think critically within an environmental context, she responded with an example in which she made use of a strategy commonly referred to as de Bono's thinking hats:

Sue: The thinking hats were good. When I taught the other Year 4 class, *Our Australia* was our topic, I used the thinking hats about the introduction of cane toads. Why were they good, why were they bad, was it such a good idea, how do we feel about a cane toad? [Su:int:26.8.08].

Once again Sue's broad understanding of EfS was apparent. She was prepared to not just choose to include an environmental issue within a specified topic to be taught (*Our Australia*) and to not just provide the children with information of an environmental issue, but to do far more, by positioning the introduction of the cane toad as something to be critically assessed by the children themselves.

Further EfS related actions by Sue centred on the practical way in which she managed her classroom:

Interviewer: Tell me about EfS in the way the classroom is managed:

Sue: We have our recycle bin where we put paper. The kids are getting very conscious of it too, like a tissue box, 'Can that go in the bin?' 'Well you had better get the plastic off first.'

Sue: We've got a munch and crunch box for after fruit break and then they go and put the peels out in the compost.

We've got a jobs chart that includes a lights person, a compost person, desk cleaner and a windows and blinds person to make sure they're up or down. We also have to turn the computer off and make sure they're off at the wall.

Interviewer: So you've got a monitor for that.

Sue: Yes we have a computer monitor. And around the school we've got big blue wheelie bins for recycle paper and the kids empty into there. Then we've got just our general rubbish bin. The kids have become more conscious of picking rubbish up in the last few weeks at recess because I saw one boy doing

it and I gave him a dot. They have dot charts. I started giving him dots and suddenly they all started doing it for the dots. They don't realise that they're doing a good thing for the environment but they are doing it [Su:int:26.8.08].

Sue had routines set up so that all children were a part of running the classroom in a manner that suggested her consciousness of sustainability in the use of energy and materials and the handling of waste. The routines constitute an example of Vare and Scott's (2007) ESD 1. As mentioned above, Sue's goals in EfS were to develop understanding but 'also just wanting to get them to be involved' [Su:int:24.8.09] and these routines could be seen as one way of doing that.

In summary, Sue provided examples of EfS in her teaching which included an across-curriculum approach to EfS; development of a 'language of environment'; development of routines of responsibility for environment; higher order thinking about environment related matters; and environment related hands on investigations that children undertook themselves. All of these were in-class initiatives with some being linked to systems available in the wider school, namely paper recycling and composting.

Sue herself explained why her EfS actions were confined to her class. As reported earlier in the section on Sue's perspective of school culture, she perceived that there was poor support for her to engage with EfS: that other teachers were not interested, and that she really could do nothing beyond what she could accomplish in her classroom. She believed that whilst other teachers were happy to do things such as conserve energy, they were not linking everyday routine actions to broader issues such as global warming.

In making this observation and through the example of her work in Environmental Maths, Sue was revealing that her understanding of EfS was far deeper than the commonly recognised need for everyday 'good' practices and was consistent with Vare and Scott's (2007) ESD 2. Her understanding of EfS in relation to the definition provided by Tilbury (1995) is illustrated in Table 8.2 which shows that it extended to helping children make the links between their own lives and broader environmental issues and included a critical dimension. Examples include critical analysis of the

Table 8.2: Coherence of Sue’s actions with Tilbury’s definition of EfS

The definition of EfS used in this column is adapted from Tilbury (1995).	Sue’s actions
EfS has relevance in that it deals with contemporary issues of concern to learners who are encouraged to explore links between their personal lives and wider environmental and social concerns.	Sue did this in many ways. An example is through the use of ecological footprint calculation.
EfS has a holistic curriculum base in addressing environmental issues and in teaching and learning, identifying the whole picture surrounding an issue.	Sue recognised the across-curriculum nature of EfS. However the holistic aspect of EfS in the sense of identifying the whole picture surrounding an issue was not really accomplished by Sue given the constraints defined by school organisation of curriculum (Environmental Maths).
EfS not only teaches about values but also teaches values, in this case ‘an environmental ethic which has sustainable living at its core’; highlighting ‘the importance of valuing the interrelatedness of the web of life and promot[ing] the principal value of concern for all life forms’ (Tilbury, 1995:201).	Sue promoted an environmental ethic through her classroom routines, through selection of children’s literature and through lessons outdoors.
EfS is issues-based wherein students ‘consider matters of fact, values and morality’, to allow for an ‘exploration of moral, social and political values required for the development of an environmental ethic’ (Tilbury,1995:202).	Sue encouraged children to read about and discuss environmental issues. She encouraged children to view knowledge as problematic.
EfS is action-oriented, both in encouraging learners to personally and collectively take actions towards sustainability, and in promoting the use of active teaching and learning strategies.	Sue used active teaching and learning strategies in the Environmental Maths program. This program and her classroom management practices also encouraged children to take action towards sustainability. She did not however encourage action of the kind that might follow from an inquiry learning project, a rich task or teaching through use of Jensen’s (2002) model of action competence.
EfS involves critical education, that is, an education that develops socially critical and political literacy skills, necessary because of the social complexity of environmental issues.	Sue encouraged this incidentally through her English program (reading, talking, listening).

‘environmental’ solution to the cane beetle problem and the manner in which she facilitated discussion of matters of interest to the children.

8.8 What enabled and what constrained EfS for Sue?

The following analysis of what enabled and what constrained EfS for the beginning teacher draws upon the previous description. In particular this analysis may contribute to suggestions for pre-service teacher preparation in a way that is relevant to the school context of, and aligned to the experiences of early career teachers.

Sue conceptualised EfS in a way that enabled her to identify opportunities to engage with EfS in her work. Added to that, her environment work was facilitated also by her own strong personal interest, in both her job and in the environment itself:

Interviewer: Do you think you feel more or less confident?

Sue: I think I have to say I feel more confident. I’ve actually done further reading, further research when topics are coming up.

Interviewer: In the environmental area?

Sue: Yeah. Like certain things I don’t understand. Like a big thing was understanding global emissions. You hear it all the time but you don’t really know what it means. So I went and read more and tried to understand more. And I went ‘Oh right I can explain this now because I do understand it’ [S:int:26.8.08].

Here in accordance with Sue’s curious and assiduous nature, she was reading to improve subject matter knowledge that resulted in a higher level of confidence, and thus enabled further work in EfS.

Sue acknowledged that Will and particular individuals, ‘one or two teachers here and there’ [S:int:25.8.08]; particular systems operating in the school (recycling and gardening); and the attractive school yard were her greatest potential support for EfS. She knew that Lou and Evan were interested in EfS even though at this early stage she had not explored the possibilities of working with them. Additionally she was very much encouraged by the children’s interest in environmental matters. Although Sue’s supervising teacher had no special interest in environmental work, he was impressed with Sue as a new teacher and was happy for her to develop skills and interests of her own [Joe:int:26.8.08].

However, as mentioned above, Sue felt limited in what she could achieve. Sue was disappointed that there was no whole school approach. She felt that her EfS work was restricted to her own class. Environmental matters were not a part of what was discussed in the staffroom, there was no environment related parent activity and no encouragement by the school for parents to take an interest in environment through, for example, school newsletters. Environment related teaching was considered of low priority, not given a 'fair go' [S:int:26.8.08]. As an example, on days when there was inadequate teaching staff present in the school, Sue would be put on a class for the day and Environmental Maths abandoned.

In the past the local environment had been an important part of teaching in the school, with children being taken annually on field trips in the local region. During these field trips regional industries and the environmental issues associated with them were investigated. The regional field trips were no longer held because preference was given to visits to the national capital organised by external providers. There was much for country children, in particular, to learn from such an event. However, this example demonstrated a shift in staff interest away from the environment, a sense that something such as environment had to be 'lost' in order to make way for some other priority, rather than teachers finding a way for environment to be accommodated within everyday business. Similarly, as discussed above, the priorities associated with national testing and accountability through testing saw environmental interest pushed to the fringe.

Sue identified other constraints. There were times when she felt that working outdoors was challenging because the children were not accustomed to moving in and out of doors for lessons and working outside. In some instances, especially with Environmental Maths, she felt that her personal knowledge was lacking [S:int:26.8.08]. She felt the pressure of meeting curriculum deadlines and the requirements of others in the school.

Other frustrations related to the combination of EfS and Environmental Maths:

Sue: There was a lack of lesson ideas that were actually out there. Basically everything we've got here has either come from me or from talking to the other Year 6 teachers. Basically we had to do it all on our own because there's

nothing out there in the way of Environmental Maths. Plenty out there for maths and plenty out there for environment but pulling the two together was difficult. So that was a very large frustration [S:int:26.8.08].

Even in the interval since Sue was employed in her capacity as Environmental Maths teacher, new resources addressing this need have become available (Serow, 2009).

As mentioned above an additional difficulty with the scheduled Environmental Maths, was that Sue was trying to teach environmental concepts through just one KLA. The Environmental Maths arrangement was unusual, but not unusual in primary schools is the difficulty presented by inflexibility in the curriculum offered in the school. The frustrations associated with this have been succinctly elaborated by Lou. For Sue, the primary limitation to EfS was a scope and sequencing of topics that she was expected to follow but which, in her view, excluded EfS.

8.9 Links between what Sue did and aspired to do and teacher preparation

Prior to EDSE 412, Sue had not thought of including an environmental perspective in her teaching:

I loved doing 412 because it gave me an area that I never really thought about [Su:int:26.8.08].

She may never have thought of it because environment related work had not necessarily been a part of the education that teachers such as Sue had themselves experienced at school, and had not been a component of earlier parts of their teacher education course. EDSE 412 appears to have influenced her attitudes and everyday behaviours:

I noticed from doing it I started changing things I do. Like at home every power point is switched off unless it's in use. So it engaged me [Su:int:26.8.08].

Those attitudes and more thoughtful actions were later evident in the way she managed her classroom. EfS in pre-service teaching had put EfS on Sue's teaching agenda.

From parts of EDSE 412, such as the inquiry learning project, Sue understood EfS as a shift in thinking, wherein people should take sustainability into account in decision making. From her teaching, for example, she wanted children to be pro-active in the environment:

Get them to look at how we can fix things. Have a look at how much electricity we use at home and things like that. Or in the school. To get them to try and problem solve and think ‘well if we did this that might lower emissions’ and things like that [Su:int:26.8.08].

Sue also remarked on how work surrounding climate change in EDSE 412 had alerted her to the global significance of local sustainability issues and how this was of particular interest to her [Su:int:26.8.08].

Sue’s conceptualisation of EfS also included work *in* the environment. As an example, she identified that the vegetable garden, the native trees, water tank and solar panels were all resources available in the school that she could use in her teaching [Su:int:26.8.08]. These aspects of her conceptualisation of EfS are likely to be linked to her experiences during EDSE 412.

Sue sanctioned particular attributes of the university unit and could explain her endorsement. In particular she mentioned bushwalking in a national park ‘because you explained how you would conduct an excursion which was good, but also because you pointed out all the different trees, the different heights of things, how that mountain range could form’ [Su:int:26.8.08]; outdoor activities ‘where we went outside and looked at things and how things worked’ [Su:int:26.8.08]; and practical outdoor activities because ‘I personally remember more from doing something and that’s probably why I enjoy it’ [Su:int:26.8.08]. An example of a practical game was the *Survival Game* where ‘we were running around and pretended we were kids and saw how that all worked and I think that’s really good to engage kids’ [Su:int:26.8.08]. Further aspects of interest to Sue included hearing different points of view on contemporary environmental issues such as from watching *An Inconvenient Truth* because ‘that was a big eye opener for me’ [Su:int:26.8.08]; and undertaking audits where ‘you had a container of rubbish and when you pulled that out we were horrified that you had kept all this rubbish’ but it was good ‘because then we could do it with our kids too’ [S:int:26.8.08]. Her comments demonstrate that she appreciated gaining new content knowledge as well as any strategies that she could use, and that gains in both knowledge and pedagogical content knowledge added to her interest in proceeding with EfS.

Sue made some practical observations that have implications for pre-service teacher education in EfS. The first ideas relate to theory and to the way EfS could be incorporated into curriculum. The pre-service teachers had been required to apply Jensen's (2001) model of action competence in the construction of new integrated units of work and to the analysis of existing units of work. Sue was shown the model in diagram form during interview:

Interviewer: That was Jensen's model.

Sue: Ah yes. That was something I struggled with. [Silence] But actually having looked at it now, now that I've had more experience, it's easy to understand. A year ago when we were still at uni it was just straight over our heads.

Applying the model had been a challenging task for people as yet inexperienced with the context of the classroom, not fully cognizant of the primary curriculum and still unfamiliar with the ways in which children might respond to particular tasks. Sue's remarks suggest that the tutors should pay greater attention to the manner in which this model, used to assist with development of programming skills, could be dealt with. There is no doubt that such skills are necessary and the following comments show how Sue struggled with the challenge of linking concepts that she wished to teach with appropriate teaching strategies and she believed that pre-service education had a role to play:

Sue: But I think [we need help in] actually being able to locate resources that helped teach, like how to teach it. There's plenty of resources out there to read about things but there's not enough that says activities you can do with the kids. So a lot of it was having to be thought up by myself ... I just feel there's not much in the way of lesson plans or lesson activities. There's lots of information about climate and global things but not how to teach it at all [Su:int:26.8.08].

Sue is here referring to pedagogical content knowledge (Grossman, 1990) and this had been a planned component of EDSE 412, but in this case the enormity of the task of learning new and complex subject matter as well as ways of teaching it is apparent.

Sue, as with many pre-service and practising primary teachers (Cutter-Mackenzie & Smith, 2003) had limited experience in her own education with the science concepts that underpin ecological understanding and this presented a difficulty to her. She realised that she needed to know more and believed that pre-service teacher education should assist.

Interviewer: That's the picture we put on the ground to explain the cycling of nutrients in the woodland.

Sue: (Pause) I think that's really a hard concept to understand, especially if you're not science oriented. I mean I was dreadful at science at school. Yeah so to try and understand how it all works and why certain animals prefer to eat this and so on [Su:int:26.8.08].

Sue elaborated the problem:

I think [pre-service teachers] need to understand and need to be able to gather more information. Because we only do it for a semester. You touch on each topic but you don't have the time to fully engage in all the different areas. You do with the research project but you only do it with one area, like mine was on water. So I got a big understanding of water but I didn't get a huge understanding of carbon emissions or about soil or salinity or anything like that [Su:int:26.8.08].

She made some suggestions beginning with the idea of organising pre-service teachers to retain lesson plans, which they themselves constructed in association with experiences designed to improve content knowledge as well as teaching strategies, and to keep comprehensive written records of class work:

Sue: I think then it's [the lesson plan] handy for later on. Like I know when I started Environmental Maths, first thing I did was pull out all my fourth year things and started going through every activity I had done. And I went through all my maths things and went through every activity and tried to think 'What can I do?' And if it wasn't written I wouldn't have had it. So it wasn't so much trouble at the time but it was a good resource later ... and I'd think, "Oh, I remember when I did that last year"... So uni work actually ended up being very useful [Su:int:26.8.08].

Sue also held an opinion about the idea of infusing EfS into a variety of units in the primary teaching award:

Sue: I think it would work better because it would give us more of a basis to know how you can come into a classroom and work it into English and work it into maths. ... They don't try and get you to see how you could work the environment into it. In English we could: they make us read so much but they don't give us readings that relate to the environment [Su:int:26.8.08].

In some schools teachers are required to teach pre-written units of work. In others they are given a topic and asked to compose the unit themselves. Teachers will search for material already prepared, suggesting that providing units with an environmental focus or building the skills of constructing units with an EfS focus may encourage teachers to include EfS.

Interviewer: So with your HSIE units, your topics are in the scope and sequence, but do you really then get to write it yourself, or is it handed to you?

Sue: No there's nothing handed at all. They just have what topic we do in what year because it's a two year cycle. In the library we do actually have kits for certain HSIE topics, not all of them. Like for the communities unit we don't have one. Which is a bit disappointing. So I have to go and think what can I do. I spoke with Joe and said "What are you doing with your Year 4?" He said "I'm doing this and this." And I said, "Ok I can work with that." [Su:int:26.8.08].

In this example Sue sought the advice of her supervisor. Supervisors are influential on the decisions made by novice teachers (Wang, Odell & Schwille, 2008) and had EfS been a planned part of the school curriculum, this would have been an excellent opportunity for a supervisor to help a beginning teacher to implement EfS. However in this example, the supervising teacher perceived no need for EfS and therefore offered Sue teaching plans in which opportunities for EfS had not been included. The implication of this scenario is that it may be beneficial to ensure that beginning teachers enter the profession armed with ample examples of teaching plans, such as those available from the Sustainable Schools website (NSW DECC & NSW DET, 2006) that they can use and that are likely to correspond closely with the curriculum offered in the primary school. The curriculum of course varies to some extent from school to school. Therefore it is of even greater importance to ensure pre-service teachers are equipped with a clear conceptualisation of their EfS goals, and with the skills and confidence to incorporate EfS into the class curriculum.

Sue's remarks and explanations provide valuable insight. She had tried to include EfS in her work and was willing to reflect on her experiences in a practical way. Her ideas inform the question of how to better prepare pre-service teachers in EfS and will be considered in Chapter 11 in a discussion of the implications of early career teacher experience.

8.10 How does the beginning teacher respond in this context and why?

The local community in which this school is situated countenances the consequences of agreements determined between political and commercial interests in national and international arenas. National and international commercial, and national and state political interests are forcing the exploration and development of coal mining in this region. Traditional regional agricultural interests are threatened by mining of coal, and

the continued use of coal for electricity generation exacerbates the global threat of climate change. Local political and commercial interests oppose the coal mining development. This is a community where, unavoidably:

Place...foregrounds a narrative of local and regional politics that is attuned to the particularities of where people actually live, and that is connected to global development trends that impact local places Gruenewald (2003:3).

This scenario shows why Education for Sustainability must be socially critical environmental education. In particular, this scenario also illustrates the imperative that every citizen should be empowered to think through environmental issues and act upon them as they see fit. Furthermore the implications of this case study reach beyond just provision of pre-service teacher education because it explains ways in which systems of education and other institutions impact on teachers' capacities to engage with EfS.

Remarks by the principal, Will, indicate his awareness of the situation in which this community is situated and his recognition of his students' need to be able to understand and critically assess the social and economic forces operating locally and their impact on the environment and local people. Despite his understanding of the local situation, the principal did not promote EfS in his school beyond making systems such as recycling available and providing vegetable gardening activities for students, albeit primarily for social more than environmental reasons. Furthermore, despite his awareness and understanding, there was no indication that he nurtured Sue's interest or gave her any particular support regarding EfS. Environmental work was given no priority in the school and under these circumstances Sue's ongoing efforts with her class could only be seen as commendable. No wonder she expressed her feeling as:

I think I was more passionate while I was at uni learning about it. And then when I came into this context where it's not a big focus. It's sort of: you start to lose the drive a bit here [Su:int:26.8.08].

None-the-less Sue persisted. Her reasons for undertaking various environment-related activities were explicitly stated as 'wanting children to understand' and wanting them to be involved. Her persistence emanated from her personal interest and concern and her belief that she could act on this concern. Implicit in her teaching choices was her

awareness of what EfS could be conceptually, and her skills in selecting appropriate learning experiences for her children, appropriate in the sense of helping them to understand and to be involved.

Chapter 9: Annie

9.1 Annie at Yarramalong Primary

When the early career teacher, Annie, and the others at Yarramalong Primary were giving their account of EfS, she had been teaching in the school for just nine weeks. However this was Annie's third school of employment and her sixth school term of teaching. Annie identified strongly with the arts: with dance and visual arts.

9.2 Context of the school

Yarramalong Primary is located in the relatively closely settled fringe of a town in NSW. Vineyards and other horticultural industries make this a visually pleasant area. Yarramalong Primary has an enrolment of over 300 students and there are over 14 class teachers, none of whom has less than five years experience other than Annie. There are 12 Indigenous students enrolled in the school and just two students use English as a second language. Few families find difficulty in providing money for extra activities at school.

The principal, assistant principal and two of the teachers interviewed remarked upon the high degree of involvement of parents in the school's activities. Parents assisted with mulching gardens, were considering raising money for dual flush toilets and spoke with the principal about waste, recycling and water matters in the school. However the Year 4 teacher, Mandy, reported a slightly different perspective on the views of parents:

Interviewer: Can you tell me anything about the expectations of parents?

Mandy: There are elements of the parent community that can see the importance of [environment] and there are others that would focus solely on the reading and writing and maths ... parents who are interested [in environment] make it known that they appreciate it [Ma:int:7.4.09].

Mandy was the teacher whom others thought of as the person in the school most interested in environmental activities. As a person with strong desires regarding EfS,

she felt that parents did not provide blanket support, acknowledging that some were appreciative but others lacked interest.

9.3 School culture

The following consideration of school culture enables key features of the context within which Annie worked, to be raised.

Goals

As intimated by Mandy, environment was not necessarily a priority for the school. The principal, Geoff, who had been in the school a little over a year, was emphatic in his response to a question about the goals of the school:

Interviewer: In general what do you think is of greatest importance in the school.

Geoff: The greatest importance in the school without doubt is our literacy and numeracy program [Ge:int:2.4.09].

His school management plan 2009-2011 reflected this priority, to the exclusion of almost anything else. Half of the principal's description of the school's context proudly detailed the school's NAPLAN results [SMP 2009-2011]. Similarly the school's targets were solely expressed in terms of NAPLAN outcomes. The school had two targets for 2009 and these were:

To improve numeracy outcomes across Year 5-6 by reducing students in the bottom 2 bands to zero

To increase the number of students in the top 2 bands in Overall Literacy in external tests to 30% [SMP 2009-2011].

The school's three priority areas were literacy, numeracy and welfare. The principal showed in his School Management Plan, that these priorities were consistent with, although not as broad as, those of the DET regional and state plans. Actually the DET Regional Strategic Plan specifically directed schools to enhance community and environmental sustainability but Geoff believed that the regional DET attitude to environment was otherwise:

Interviewer: What do you feel is the view of the region? Do you feel that [EfS] is something you are encouraged to engage with or is it really not on the agenda?

Geoff: There has been a slight increase in encouragement in the sense that SEMP's were discussed at one of our mandatory meetings. But that's about it [Ge:int:2.4.09].

It was once again apparent that principals are pressured to improve NAPLAN results in their schools. Geoff may have believed that regional intentions with regard to sustainability were ambivalent or insincere and he was choosing to overlook them. Certainly the school management plan, in its descriptions and aspirational statements, made no mention of the complex social and scientific learning and valuing surrounding EfS.

The assistant principal, Jess, personally valued social learning, but acknowledged the contemporary importance of academic goals:

Interviewer: What do you think is the most important thing in the school? What would you write as the goal statement of the school?

Jess: A sense of inclusion within the school. That's one good thing we've always had here. And that's well known around the community. Acceptance and inclusion.

Interviewer: Where in that goal statement do you think academic goals would lie?

Jess: Well that's changing over the years and that's probably coming higher and higher each year and that's for a variety of reasons. It's the pressure from the external exams such as the NAPLAN and it's the changing executive in the school and parental pressures [Je:int:6.4.09].

Jess believed the school to be 'quite lucky' because it 'sits a bit above [the average] in NAPLAN testing' [Je:int:6.4.09]. She attributed the emphasis on academic goals to three areas of pressure: external exams, and the expectations of parents and the school executive, consistent with reports from others. Change had occurred, and this change reflected broad societal values.

At least one teacher however was confused about the goals of the school. Veronica had been a teacher at this school for 16 years:

Interviewer: What do you think this school strives for?

Veronica: I think it's changed over the last couple of years. We've had a change in principal and so it has changed. At the moment I'm not quite sure what we're striving for. I don't think it's been sort of laid out. I think we're still a bit all over the place. Where before you knew that you were always striving for the

children to always do their best, we had good community relations, you knew what you were looking for in the children, not just academically but as children. They were things that were very well laid out and as a whole staff we were consistent with. But I think at the moment we're still a little bit all over the place. I don't know whether we've really got a new vision. But the old one doesn't seem to fit [Ve:int:6.4.09].

Veronica appeared to be somewhat bewildered by what she perceived as a change in focus, in a direction away from the children themselves. Formerly the school had a positive and community based focus far broader than just the children's academic outcomes [Je:int:6.4.09]. Such an expectation could reinforce a culture of individual competitiveness where 'what you were looking for in the children, not just academically but as children' was less important. EfS on the other hand encourages the collaborative action of communities in response to mutual valuing of a shared environment. If teachers, as a group perceived, as did Jess and Veronica, that there was an expectation that their primary role was test result improvement, then EfS was likely to be marginalised in the school.

The school's current prioritisation of literacy and numeracy test outcomes flowed through to the selection of topics for professional learning, to the allocation of resources, to curriculum and to teachers' attitudes towards their curriculum choices. As an example, provision of professional learning revolved around the three priority areas of the school. Environmental work was not a part of this:

Interviewer: Has there been any professional learning in EfS or is there any that you would particularly like for your staff?

Geoff: No there really hasn't been. Probably that is something that needs to happen but it's not something that I have planned for in the very near future [Ge:int:2.4.09].

Similarly the assistant principal believed 'it [EfS] would be a good thing. It's definitely something we should be doing' [Je:int:6.4.09]. This appeared to be a case of people believing that the environment was a beneficial thing to be thinking about, but insufficiently important to be something to which resources such as professional learning time should be directed. The School Management Plan showed that all professional learning expenditure was oriented to the two target areas.

One of the key avenues for professional learning in the school was a system of team meetings. Team meetings occurred at three levels. Primary amongst them were the

fortnightly meetings and school development days where teachers developed skills around one of the three priority areas of the school, literacy, numeracy and student welfare:

Interviewer: Do you see your staff working with a whole school or big picture view or do you see them working more as individuals focusing on their own classes?

Geoff: A bit of both. I think they do have a big picture view because that's the way we approach most of our targets and so forth. We have organised staff around teams. We have three teams that are designed to explore the management plan priorities [Ge:int:2.4.09].

The principal seemed to be implying that because each teacher contributed within one of three teams to plan teaching for one priority area, a degree of 'whole school approach' was in place.

The second level of team meetings was the fortnightly stage level meeting where teachers in each stage together planned and coordinated work for their classes. A third and voluntary level of team meetings was for other responsibilities to be maintained within the school, and the environment team was one of these. Three teachers, Mandy, Jackie and Annie comprised the environment team. Whilst time resources were timetabled for the first two levels of team meetings, no resources were set aside for the environment team who met opportunistically at lunch time. Potentially this arrangement has the effect of marginalising matters of environment.

When Geoff was asked if he believed his staff worked with a whole school view or as individuals, he responded that there was a 'bit of both'. Veronica, Year 2 teacher, who had worked for many years in this school believed that the partitioning of staff into three committees each responsible for decision making in a priority area was not necessarily advantageous in terms of the culture of the school.

Veronica: But I think that it's really important that whatever decisions are made, they're made as a whole staff so that we've got ownership. Now we're on all these committees so that there are committees that are making decisions that you have to abide by but you haven't been part of that decision making. I know you've got to do that because of the time factor, but still ownership I think is really important [Ve:int:6.4.09].

The NSW DET *Policy* (2001a) advocates implementation of EfS using a whole school approach. The suggestion arising from Veronica's observation is that whole school initiatives could be compromised by the partitioning of responsibilities. This is not the impact that the principal perceived the staff development arrangement would have. If Veronica's perception was valid, there was a lack of whole school cohesion that would therefore act to constrain whole school EfS. Veronica provided an example of a constraint to EfS associated with absence of a whole school approach:

Veronica: With the worm farm it's the responsibility of Year 4. My Year 2 children haven't seen the worm farm or don't know anything about that. So if we're all given the opportunity or given jobs within that project it would be good [Ve:int:6.4.09].

Veronica's solution to a situation where teachers engaged with EfS on an individual basis and where this approach was associated with lost opportunities for learning (such as Year 2 not having seen the worm farm) was a whole school approach:

Veronica: I think if that's part of what we have to do as a whole school I think we would have to get together as a whole school and work out how could we make it important. How could we make that time, even if it is just a few minutes, how can we find that time [Ve:int:6.4.09]?

She went on to explain that whole school EfS meant not just planning as a whole school, but also sharing responsibility across the school:

Veronica: Maybe when they start the veggie garden that it's not just the responsibility of one class. That each stage or each class has the responsibility for some part of it [Ve:int:6.4.09].

For Veronica whole school sustainability projects were 'very worthwhile' but she conceded that 'It gets harder as the school gets bigger and the curriculum is so crowded' [Ve:int:6.4.09].

Whole school projects have long been advocated in the literature of EfS (see for example Henderson & Tilbury, 2004). Consistent with that literature, here was an experienced teacher explaining why a whole school approach to sustainability is necessary. She explained that, if EfS is deemed important, then it must be declared a priority and everybody must have an agreed part to play. This requires leadership in

favour of EfS from the hierarchy of school management, of a kind not evident in this school.

Organisation of curriculum

Stage teacher teams were collectively responsible for programming that part of the school curriculum appropriate for their children. Together they constructed a scope and sequence for reading, writing text types, grammar and mathematics [Je:int:6.4.09]. Many teachers followed a commercial spelling text but all were free to devise their own spelling program. For mathematics there was a stipulation about topic and a common assessment task across the grade but no stipulation about methods of teaching. These arrangements allowed individual teachers to determine teaching strategies and resource materials in consultation with other team members, and within the school's broad curriculum framework. Teams of teachers planned units of work for science and social science, using suggestions from Board of Studies syllabus materials (Board of Studies NSW, 1998). All excursions were to 'promote School Plan targets' and/or social science and science themes [SMP 2009-2011]. This meant that interested teachers could, if they wished, provide the rich experience of local place so cogently argued for by some to be of importance in EfS (Palmer et al., 1999; Gruenewald, 2003; Malone, 2007; Ballantyne & Packer, 2009). However, there was no firm developmentally appropriate excursion framework providing sequential, real world experiences that incorporated the goals of EfS. In the absence of explicit direction, this and other aspects of sustainability education could legitimately be overlooked by teachers whilst the school curriculum and its excursion policy were being adhered to.

Superimposed on what appears in many ways to be a consultative approach to curriculum, was a system of preparation for NAPLAN testing. From the School Management Plan comes the stipulation that all children to be examined were to commence preparation twelve months in advance of the tests:

NAP Planning

During semester 2 of each year, students in Years 2 & 4 receive preparation for the NAP testing. This includes multiple choice questioning formats and techniques, use of the language and test situations.

During Term 1 of each year, students in Years 3 & 5 receive preparation for the NAP testing. This includes multiple choice questioning formats and techniques, use of the language and test situations [SMP 2009-2011].

This strong orientation of school resources to school plan targets could be considered admirable. However, in the absence of targets broader than two, and priorities broader than three, there appeared to be little official space for EfS in the school curriculum. EfS it would appear, was at the discretion of individual teachers who could incorporate it in their work, but only to a degree which was seen to not detract from the attainment of school targets.

Environmental activities in the school

In spite of these limitations to EfS in the school, there were existing practices that reflected some environmental concern. Tree planting had occurred on many occasions, with plants being donated and parents helping out with garden working bees. However despite the frequently reported interest and physical assistance of many parents in environmental matters, EfS remained a poorly developed aspect of school culture. Many trees had died, mainly for reasons associated with maintenance [Ke:6.4.09]. The school groundsman, Ken, considered that trees planted by children and gardens created by parent working bees were not his responsibility [Ke:6.4.09].

Paper recycling was in place but overlooked by many classes. Jackie, a Year 1 teacher, explained that this was because containers for recyclables were not conveniently placed and Veronica believed there were ‘problems with things being picked up and where to take it’ [Ve:int:6.4.09].

There was visible evidence that a vegetable garden had at some time operated and composting and worm farming were organised within the school. Classes each held a bucket for compostables and each class delivered this bucket to a drum outside a shadehouse at the edge of the school yard. Year 4, who studied worm farming in class, took responsibility for emptying the drum. The organisation of this process was as follows:

Mandy: Each class has their own bucket and they then have their monitors that tip their bucket into one of the two bins just outside the shadehouse. And then

my class go once a week and transfer into the worm farm what the worms can eat and the rest to the compost bins.

Interviewer: So do you all go over at the same time?

Mandy: No I have two children rostered on together and they rotate through. Only those that are keen because some of them are turned off doing it. Last year I tried making everyone do it but it just wasn't happening so I thought I should go on interest.

Interviewer: And once a week is sufficient?

Mandy: Yes they recommended feeding the worms just once a week. Obviously the compost bin should be getting emptied more often but I don't believe it's fair to expect children to be out there doing it in their lunch break and it's not fair that some kids should be doing that instead of class. So it was just the best way to do it at this stage. Not optimum. But I get no help from the GA [general assistant, Ken] [Ma:int:7.4.09].

The complications of organising this particular initiative are apparent from Mandy's description, and the procedure appeared to be less than satisfactory. Year 4 children were not necessarily keen to do the job and because the Year 4 teacher found her endeavours with regard to worm farming and composting to be not well supported, she periodically was forced to empty the drums herself. At the time of interviews, the drums of compostables were waiting to be emptied and surrounded by a cloud of visiting vinegar flies. A better system was needed.

Mandy felt abandoned in her EfS endeavours: 'I didn't want it to be dependent on me. But it has become that way', and she believed that the principal was disinterested:

Interviewer: How important do you think environment work is to the principal?

Mandy: I think that he has other priorities.

Interviewer: Which would be?

Mandy: The three Rs [Ma:int:7.4.09].

Her opinion is supported by statements from the principal himself:

Interviewer: What's your view of the place of EfS in the curriculum?

Geoff: Unfortunately due to the crowded curriculum I believe it often gets pushed to the back [Ge:int:2.4.09].

This position held by the principal made it difficult for Mandy to maintain her environmental aspirations:

Interviewer: What else is there that's really holding things back?

Mandy: You need to have the powers that be on side. You really do. Because they are the ones that can give you time so that you can develop the policies and programs.

Don't get me wrong I'm happy enough to do things as they are but I do have a big load so it's quite difficult. People need to see the value in it. Because it can be a valuable thing. Some people are more passionate about it than others and it's a very hard thing to change. So you either value the environment or you just think "oh well" [shrug] [Ma:int:7.4.09].

The principal appeared not to value the environment, nor EfS. It was evident that his leadership in this area, fell short in development of a SEMP, in provision of guidance in curriculum and EfS, in provision of professional learning opportunities in EfS and in assistance with the organisation of personnel and facilities that would see all members of the school community participating in more sustainable management of the school. He was unconcerned and prepared to leave responsibility to anybody who would act upon their own interests and values:

Geoff: Basically because of the way teachers are, they get their little area of expertise. Mandy is all the time talking to the teachers about it [curriculum integration of EfS]. But because the other teachers have their own area of interest, unfortunately it gets pushed back and pushed back. But Mandy is very, very committed in that area [Ge:int:2.4.09].

Veronica and Mandy have incidentally explained what 'principal support' can actually mean in this situation. It means that the principal must publicly endorse the importance of EfS as a school priority, facilitate the involvement of everybody especially through allocation of time for whole school meeting and collaboration, and provide professional learning opportunities. In turn it seems likely that there are principals who will only act in this way if they perceive that the regional and state DET hierarchy also prioritise EfS and want it to happen.

Indifference was hampering the implementation of EfS in this school. The current principal however was not alone in neglecting to support the interests and enthusiasm of teachers in the area of EfS. Both the librarian, Simone, and Mandy described a past sustainability initiative with aspirations for whole school involvement:

Simone: About ten years ago we started the compost buckets. We had bins outside where the kids were meant to put their food scraps and another bin for

paper scraps and one for non recyclables. That was fine initially because people kept driving it. But it didn't really get its own momentum and they didn't keep doing it. The people who were really in charge of it didn't keep the momentum going so that stopped. That all fizzled because nobody kept driving it [Si:7.4.09].

It seems to be the case that either somebody needs to be directly driving a project, or alternatively, school executive need to be ensuring the organisation of the school facilitates and encouraging a sense of ownership and cohesiveness wherein everybody takes a part in whole school projects. Skamp (2009) reported how one teacher drove sustainability learning in his school, and how drawing other teachers into sustainability teaching associated with outdoor projects was an extended process that had to be planned for and supported.

How teachers in the school interpreted EfS

Teachers were asked to provide their interpretation of EfS. Sometimes the term 'EfS' was unfamiliar to the person, but none-the-less his or her understanding of the commonly used term 'environmental education' is reported. Those selected to respond included the principal, assistant principal (also Annie's supervisor) and those people in the school identified as having an environmental interest. If Annie were to receive support for environmental work within the school, then it would seem that those people would be the ones in the best position to provide it. Their interpretation of EfS is therefore a relevant part of the context within which Annie was making decisions about environmental activity.

The principal was asked for his understanding of EfS:

Geoff: I think it's really important for people working in schools to be really aware of the place [of EfS] and the place across the curriculum, and to see it as an educational aspect of the curriculum rather than as a management aspect. And I think that in a lot of places where I've worked the emphasis of environmental education is on the management of waste and that sort of thing rather than the educational side of things. It's important that it's not just put down as a management thing that one or two people in the school look after but that everyone in the school is aware of it and has ownership of the impact that it has.

Mandy has been integral in working with other teachers in making them aware of how they can approach sustainability in areas of literacy and numeracy. So that it's integrated in there and they're basically killing two birds with one stone

rather than trying to find an independent time for this to happen. That is probably the best way to approach it [Ge:int:2.4.09].

Interviewer: Do you see EfS as an opportunity for the school?

Geoff: I see it as a great way to promote the school. I think the community appreciates it when the school is aware of it. And I think more and more people in the community are aware of issues around sustainability and doing recycling and that sort of thing at home. They want the school to be doing the same thing. It's not as though you want to trade off it but I believe we have an opportunity to make ourselves well thought of in that regard. So while you're doing something for the kids and the environment, you're also doing something for the school within the community as well [Ge:int:2.4.09].

Indeed Geoff indulged the environment interests of parents, having twice placed internet links to advice on more sustainable practices, such as energy saving, in the school newsletter. The principal's espoused conception of EfS bears similarity with that proposed in the NSW DET *Policy* (2001a) in terms of curriculum integration and community involvement, but otherwise contains no notion of caring for environment or of preparing students to adapt to, and to shape the future. In other words he spoke about the form rather than the substance: how EfS could be undertaken rather than what he understood to be the purpose of EfS. He argued that EfS was more a curriculum matter than a management matter. The need for a curriculum emphasis is highlighted in a report on the NSW Sustainable Schools Program from Funnell and Larri (2005) who observed that unfortunately curriculum is the least well developed aspect of the triple focus of EfS: curriculum, grounds management and resource management. Lacking from the principal's statement is any *commitment* to curriculum integration of EfS or recognition of its importance in the lives of the students in the school. He did acknowledge the time efficiencies of curriculum integrated EfS, and the political advantages of conducting environmental initiatives, given the interest of the community. Remarks from teachers in the school and the SMP suggest that he did not act upon his espoused view.

Year 1 teacher, Jackie, spoke of practical aspects of EfS. Her view of EfS included more than curriculum, instead it included the physical aspects of, for example, waste handling. For Jackie, unlike the principal, EfS was very much a management matter for the school.

Interviewer: What does EfS mean to you?

Jackie: To me that would mean getting programs into place that are going to be ongoing. That will keep on promoting environmental awareness with kids. Keeping up with programs, with recycling.

Yes so EfS is just doing those things and keeping them going and adding things to it. The kinder/Year Ones, by the time they get to Year 6, these things go in the recycling bin and these in the compost bin.

In my last school I ran a group of students once a week and we did things like tidying up and weeding and gardening in an area. It was good.

Interviewer: That was an environment group?

Jackie: Yes, we started with kids who behaviour wise couldn't interact with other kids but when it came to doing physical things they just loved it [Ja:int:7.4.09].

Jackie's interpretation of EfS fits within Vare and Scott's (2007) description of ESD 1, that is, directly teaching people ways of living in a more sustainable fashion. For Jackie one of the greatest values of environmental work emanated from outdoor projects and was in terms of social learning as reported by Malone (2008).

Veronica, a Year 2 teacher, was unfamiliar with the term EfS:

Interviewer: We tend to use the term Education for Sustainability now rather than environmental education. Does the term Education for Sustainability mean anything to you?

Veronica: Not really. That language doesn't really mean anything to me because it's not the language that I'm used to [Ve:int:7.4.09].

As with Jackie, Veronica valued social learning through environment related work. In her view EfS projects provided pride in achievement, class cohesion and catered for children's different learning styles:

Interviewer: With regard to Education for Sustainability or environmental education, what would you tell me to do in teacher education?

Veronica: I think stress the importance of it. Stress how it can be relevant to the different ways children learn, visual, tactile and so on. Stress how it can make a difference. If they're working on projects together the class is more cohesive and you're using your environmental education to bring the class together. I think it's important that they do something they're proud of. I think with environmental education you often see a result of what you've done. And I think that's important for the kids to do something and feel proud of what they do [Ve:int:7.4.09].

This is exactly the kind of integrated work, focused on environment, which is promoted through the NSW DET *Policy* (2001a).

Like Veronica, Jess the assistant principal, was also unfamiliar with the term EfS. As with the other teachers and the principal, she was not expressing ideas about preparing students for a changing future. However, she understood that environment work could be integrated into curriculum and that this could be an advantage for children's learning:

Jess: What I'm trying to get Annie to do, if she does do the veggie patch, is to link it as much as she can to the other KLAs. So if she's going to plant the seeds, link it to writing a procedure of how you plant the seeds. I guess that would be my one thing because time is so scarce. You have to link everything. But if you do that in a really practical manner I could see great value [Je:int:6.4.09].

Mandy expressed a view of EfS which was closer to the future orientation and sustainability principles of EfS:

Interviewer: What does the term EfS mean to you?

Mandy: To me personally it's the whole picture of educating the whole child to understanding how to look after themselves and to look after the environment. They are responsible and they can do their part and the long term effect of that will be more positive.

Interviewer: How do you see Annie's ambitions, with regard to environmental work sitting within the overall apparent goal of the school in terms of literacy and numeracy?

Mandy: With what she's planning to do with the vegetable garden and tying it in to her unit on '*The way things were*' and then to tie it in with their reading and writing I think it fits in beautifully. And it just takes people to be creative with that to make it fit. And children do learn better when they can base it on experience. So I think she's trying to tie it in really well [Ma:int:7.4.09].

As indicated by remarks from Veronica, Jess, Jackie and Mandy, there were teachers in the school who recognised the potential of EfS for achieving learning in areas that are highly valued beyond those narrow goals being officially promoted and resourced in the school. It would appear that there were teachers in this school who had good understanding of the skills required to engage with EfS, and could do so, should they be encouraged.

Whilst Jess and Mandy acknowledged the importance of curriculum integration of EfS, as did Geoff, their view was different in that they saw advantages for children's learning from the alignment of curriculum with practical experiences, as others have

done (Munns, et al., 2006; Ballantyne & Packer, 2009). In this way, sustainability is a management as well as a curriculum issue (and therefore a part of Geoff's responsibility).

From these views, and the preceding description of school culture, it can be surmised that this school remains in what Scott (2007) describes as the first of four stages of development towards a sustainable school. This is the stage where there are isolated curriculum inputs by individuals, and school leaders are 'probably not convinced or particularly supportive, but they are reasonably tolerant' (Scott, 2007:67). There are small projects, and some community links, but 'no commitment or resource to making serious changes ... no sense that a focus on sustainability might contribute to enhancing student achievement, and the ethos of the school [does] not relate to these issues' (Scott, 2007:67). This principal did not support the management aspect: classes couldn't find the recycle bins; the compost system was faltering and he evaded such matters.

In this school, the principal espoused (but did not act upon) the notion that an EfS curriculum focus is as necessary as more sustainable management of resources in the school. Scott (2007:64) explained why this is the case:

Experienced teachers say that what really raises levels of achievement is students who are motivated and interested in, what they are doing ... Sustainability issues bring a distinctive and extra dimension ... they are not issues that are taught about in some abstract way-they are issues that matter-and matter in terms of how the school operates as a community.

Based on their experience, Jess, Mandy and Veronica were familiar with active student involvement and the connection between interest and learning. Teaching through using issues that matter in the school community is central to the notion of a whole school approach to sustainability. For whole school involvement to come about, the combined efforts of teachers in the school and strong leadership at all levels of the DET hierarchy may be required. There was no indication that this was about to happen.

9.4 Annie's views of EfS as pre-service teacher

At the completion of the university EfS unit (T2), Annie ranked her desire to include EfS in her teaching as 'very strong', that is, a 'ten' on a scale of one to ten [An:SurvB:T2]. 'Because the environment is where we live and the environment is how we survive and if it weren't for the environment we wouldn't be here. We should understand that and improve it for future generations' [An:int:T2]. Environmental education was a part of Annie's teacher identity (Kagan, 1992; Wideen, Mayer-Smith & Moon, 1998), of what she felt she should do.

As already reported (Kennelly, Taylor & Maxwell, 2008), Annie expressed the caring values associated with EfS (Fien, 2003). She attributed her care for environment to earlier experiences in her life:

Annie: The experiences that have motivated me to teach environmental education? My life experiences have [included] my grandma as a person. She supports the environment. Having a very cherished childhood where the land was very important to me. Having family support in the environment. Experiences that I've had connecting me to the land, for example Aboriginal Elders showing me the significance of the land for their survival.

Interviewer: That's had a huge impact hasn't it?

Annie: Yes it has, it definitely has and being one of the only white children in the class. This was at Kalinga Primary. I was there for a year and it had a big impact on my life. Getting to realise there is this other way of living. For example all I wanted to do was play barbies but they [the Aboriginal children] wanted to go and find sea urchins and run along the beach and make things ... And finding food in the environment ... all this other realm of play.

Her grandmother, a role model whose lifestyle expressed a sustainability ethic, the manner in which her family was involved with the school, and the Aboriginal community, all were particularly significant:

Annie: My mother did the murals at Kalinga Primary. If you go there there's a range of murals and they're all Aboriginal. The Elders used to come in and design these murals with my mother and all the children were involved with the painting of the murals, learning the significance of the stories that had come from the dreamtime. I was in year 3 so I was nine.

[The Aboriginal children] found a lot of satisfaction in creating things from the environment and playing games that incorporated the environment. They incorporate things like the trees and all sorts of things into games which I also did at my other schools but it was more like tip and card games and basketball, whereas theirs was very imaginative and creative as well as the other games like soccer.

Interviewer: Why were their games different?

Annie: Because of their upbringing, because of the Elders, and their connection to the land is always important to them and goes back centuries. It's ingrained and from a child's perspective you pick that up. You can learn their values by being around them [An:int:T2].

This response shows that Annie, as pre-service teacher, readily engaged in a process of self analysis of values and experiences from the past. She revealed a personal identity that embraced affinity with natural environments, an affinity that was recognised by her as being strongly influenced by those early life experiences. Furthermore she believed that early experiences connecting her with nature established her desire to engage with EfS in teaching thus providing an example of the importance of such early experience as described by Palmer, Suggate, Robottom and Hart (1999).

As pre-service teacher, Annie had firm ideas about the kinds of experiences that children should have and indeed that teachers should have:

Annie: The Arawara people used to live just down the road and take us on bush tucker walks and things. For a student, the history of living in a place where the Aboriginal people still have a wealth of knowledge was really powerful. And for a teacher to realise the impact it has on a child is really powerful. It is necessary for us as teaching professionals to get that sense of belonging [An:int:T2].

Annie considered that a central formative experience for her as a teacher was the time spent in natural places in the presence of others who deeply appreciated those places. It was her belief that the development of a sense of belonging to a special place was essential not only for children but also for teachers so that they could understand how children were affected by the places around them. It would seem that Annie had engaged with the 'cultural-ecological thinking' that Greenwood (2008:340) argued was necessary in order to 'ground environmental education' meaning to give it practical expression within particular locales and communities. Additionally, Annie was expressing exactly the point made by Noone (2006) that an ethic of care is intimately connected to the ability to be responsive to place. According to Noone (2006:225), if the aim of environmental education is to develop an ethic of care then *teachers* must first *learn* to care; and teachers' learning to care 'is intimately linked with their own ability to be aware of and understand their relation to place'.

Values were the most important element of EfS for Annie. This was well established whilst she was still at the university. As pre-service teacher, Annie believed ‘it’s [EfS] all about values, for me. I think it’s definitely all about values. That’s where I would start with my educative role’ [An:int:T2]. Unlike the environmental educator whom Barrett (2007) reported was inhibited in his environmental teaching, through a culturally influenced inability to express his environmental values, Annie repeatedly made her environmental values explicit and overtly reflected upon them. These values were incorporated into her identity as teacher and were influential on teaching and learning decisions made (Flores & Day, 2005).

As intern (T3), Annie was asked what EfS meant to her:

Annie: It means it is my responsibility within my classes ... to actually get them to realise that they can make a difference in their small ways. For a more sustainable way for their own living and to try and pass that on to their children and try and really make it a key value [An:int:T3].

Here Annie is demonstrating how her teacher identity influences her intention. In particular, she believed her teaching role could help shape the future by helping children to learn more sustainable ways of living, and to believe that their actions mattered.

Survey data at T2 showed that when asked how confident she felt to include EfS in her future teaching, Annie claimed to be ‘very confident’. At this time she attributed her confidence to her holiday experience working with children as a sport and recreation teacher, a love of the outdoors and a conviction that: ‘if portrayed in the right way, other people and students will become excited [about the environment] too’ [An:int:T2].

9.5 Annie’s perspective: school culture

Although particular individuals at Yarramalong could be identified as having environmental interests, it was Annie’s perception that environmental issues and environmental education were seldom overtly discussed:

Interviewer: Tell me about the staffroom talk.

Annie: There really isn't any concerning the environment. It's literacy and numeracy, no cross curricular stuff. Sometimes they talk about behaviour management concerns, their families [An:int:6.4.09].

For Annie, there was little enthusiastic or reflective discussion of environmental matters or the creative arts, into which she might be drawn, and to which she could contribute her ideas.

Annie was aware of the priorities of the principal:

Annie: I feel pressure to improve literacy and numeracy outcomes.

Interviewer: Can you describe that pressure? How does it come across?

Annie: Direct. Principal has said to me "Annie, stop worrying about all your extra-curricular things and start improving your literacy and numeracy program. Don't worry about anything else. Just make sure that's in place first. Then you can start to think about other things" [An:int:5.4.09].

The principal's remarks in this instance and the manner in which Annie reports them suggest the presence of an unquestioned 'orthodoxy' (Ferreira, 2009) in favour of proclaimed school priorities, and to which it was expected that teachers would conform.

Annie was aware of the school's requirement that maths should be taught for one hour each day and that literacy studies should occupy the whole morning. The text types to be studied for English were prescribed during meetings, but Annie was free within this agreed structure to 'do it my own way' [An:int:7.4.09]. It seemed that the accepted way in which others organised the curriculum was contrary to her own ideas:

Annie: I'll just follow what they're doing and try and branch off because it seems very much like I'd be stepping on toes if I went off on my own to do literacy and numeracy when it's such a critical part of the daily routine. I should definitely show that I can master theirs before I go and do my own thing [An:int:5.4.09].

Significant in terms of Annie's perception of school culture is her sense of 'stepping on toes'. Although there was some freedom in programming, she was apprehensive about exercising that freedom. She appears to have no real power to do other than what she imagined she was expected to do. This can be understood in the context of her being a novice teacher and the power relations that come into play.

As supervisor, Jess scrutinised Annie's teaching, observing lessons and making specific recommendations to Annie. She had implied that Annie's performance was inadequate:

Jess: Well I just feel at this stage that she's had a lot of things happening. A lot. New school. And there's a lot of learning still to happen. At this stage she's keen to do the veggie patch, she's made a scarecrow and I guess what I've got to be aware of is: yes I encourage her to do all those things, but there's still a lot of other things that need to be put in place as well [Je:int:6.4.09].

In other schools there were prescriptive guidelines that kept novice teachers working directly towards the aspirations of the school regarding academic performance of students. In this school, with few inexperienced teachers, and where teachers enjoyed relative freedom with respect to teaching methods and curriculum content, other means were deemed necessary in order to keep staff directly focused on the task of improving literacy and numeracy performance. Pressure on Annie to conform was coming from several directions.

When Annie was asked why she thought the principal saw 'extra-curricula things' as incompatible with teaching of literacy and numeracy, she replied:

Annie: Because everyone is worried about the NAPLAN tests in Year 3 and Year 5. So there's just the push to get the text types done and all those things they need to know for those exams. Because they're across the state.

Interviewer: And in his view?

Annie: That's what the school needs, to make it comparable with other schools.

Interviewer: What do you think he thinks is the best way to make the school's scores good in the NAPLAN tests?

Annie: Because if you're spending more time on those and having literacy and numeracy as a priority and not sharing among other KLAs, then the kids in his view are going to excel more in those two subjects. Because they've had more exposure to it and because the teacher is seen to be more interested in those two. Not just the teacher but the whole school. That's the priority [An:int:5.4.09].

Annie's view was that the culture of the school was distorted towards narrow academic priorities and she felt that these priorities were the concern of 'everyone' else. She was aware of the belief of the principal, as evident in the SMP, that greater exposure of children to formal preparation for the national testing program would produce improved results. This outlook was different from the kinds of alternative approach that are advocated in EfS, for example rich experiential learning (Ballantyne

& Packer, 2009) or curriculum connected physically and socially to local place (Gruenewald, 2003; Gruenewald & Manteaw, 2007). Indeed Gruenewald and Manteaw (2007) argued that standards based testing regimes in traditional content areas, as in NAPLAN, and environmental education 'are to some degree contradictory and incommensurate'.

Even though she had been at this school for less than one school term, Annie had made some suggestions for 'extra-curricular' activities. From her teaching experience she had learnt:

Annie: If you want to do something you need approval. You can't just go and do it and getting approval is very difficult. And that's what I've struggled with at each of my schools so far. So you need to be able to put it forward in a way that's going to make the school look good. Otherwise it's seen as a waste of time [An:int:5.4.09].

Annie perceived that Geoff was concerned about the image of the school within the community. She believed that this was not because he was trying to attract more children to the school. Rather she perceived that the principal believed that the parents wanted children to gain good academic results and that good NAPLAN results would provide parental satisfaction with the school:

Annie: We just want these kids to show the best marks. We don't need any new exciting things. We just need good marks: happy kids, happy parents [An:int:5.4.09].

Annie appeared to be cynical about the primary motivations of those most influential in shaping the culture of the school, and possibly this cynicism arose from her perception of the principal's disinterest in ideas for extra activities, beyond preparation for the national tests, as well as from her own contrasting views of the nature of childhood and what was important in teaching.

9.6 Annie's perspective: how she interpreted EfS

Annie held a strong conservation ethic that incorporated concern for the future:

Annie: I think it is important for the children to understand that what we have now in the environment may not always be in the future if they do not learn to look after and rejuvenate and protect the environment and make it so that future generations of plant and animal life can survive [An:int:5.4.09].

Annie believed also that the young children in her class should experience the environment of the present, such that they understood that future environments could be diminished and therefore needed protection.

There's a lot of mining and devastation of the natural environment where a lot of parents of the children work. So they don't understand and haven't been involved in environments that are pristine and lovely and have lots of life. There are lots of mines where there's just dead earth stretching for kilometres.

And the other pleasant environments are all either vineyards or small farms so a lot of the natural environment has been taken away to replace it with those sorts of things.

Interviewer: So you identify this in the lives of your children. What do you see that you need to do?

Annie: I think it's really important that they're exposed to environments that are natural and that sustain other life that hasn't been put there by people [An:int:5.4.09].

Similarly Zemits (2006) argued that children should learn to understand natural, relatively undisturbed environments including the ecological links between elements of those environments. For Annie the purpose of this was not only to establish a sense of care and connection but also to build students' capacity to actively restore the environment:

Interviewer: You have told me that you feel children need experience of natural environments, and the reason for that is to ... ?

Annie: Make sure they can look after them in the future: the natural environments that are already there and perhaps establish for themselves an understanding of how we are endangering animals. And also of what those animals are and plants as well. And perhaps rejuvenate places that have been degraded. Perhaps not to their original state but so those animals and plants can come back [An:int:5.4.09].

As with Annie, Fien (2003:4) considered that before people would want to act for the environment they needed to learn to care about 'each other, other creatures and for the natural world'. Martin (2007) argued that learning to care for and to take responsibility for environment could result from experiences *in* the environment and with understanding of the environment. Annie seemed to sense that this was the case. She expressed her understanding of these essential connected elements: experience of natural places; development of a desire to care and protect; and the importance of understanding the connections between everyday activity, such as electricity use, and environmental impacts:

Annie: And through that feeling of care for plants and animals it then is important that they start to understand how with our mines creating electricity, to understand how much even just the usage of electricity takes from the environment and causes us to build more mines.

Interviewer: You're talking about the everyday use of electricity.

Annie: And water, with what happens to the environment. So taking them back to the roots and starting from there I think is the first place to start teaching them. *Then* about solar power and water audits so they get the feeling for why we're doing that. Not just leap straight into recycling and all that sort of thing, not until they understand why we are doing it. So I think it's important for them to understand the connections [An:int:5.4.09].

Jensen (2002) argued that to be action competent, students should understand environmental issues. Providing them with solutions (ways of behaving as described by Vare and Scott (2007) for ESD 1) would not solve the problems of environmental degradation. The goal rather was for people to be able to understand the issues so they could work out the solutions, then to be sufficiently motivated to act upon their own sense of responsibility. Similarly Annie perceived that training the children to act more responsibly was no real solution. Firstly they had to understand that a diverse and beautiful world existed, that this was something worth caring for, why and how it was being degraded, that degraded areas could be improved and natural areas conserved, and finally that they could bring about change through their own actions. When asked what was most important in EfS, Annie replied:

Hands on activities that promote a productive outcome for the environment and something they can take away with them into their future and maybe pass on to other people. So if there's something easy, something that everyone can achieve in their own home. I want them to do activities they can take other places and actually achieve even if it's only a herb garden in a pot plant or a frog pond with a bird bath full of water: something that they can achieve [An:int:7.4.09].

As with Gruenewald (2003), Zemits (2006), Martin (2007), Ballantyne (2009), and others, Annie argued that children should be exposed to the complexity of the real world and that her role as teacher was to provide opportunity for this to happen. Annie's aspiration was for a 'productive outcome'. Similarly, Smith (2007:192) argued that projects from which students 'perceive themselves as capable and successful actors' can 'impart to children a sense of their own agency and collective capacity to alter their neighbourhoods ... for the better'.

The notion of belonging to and caring for place was prominent in Annie's thinking and that was why she was observant of an uncaring attitude of children in the playground. She acknowledged the role of water and energy audits but these were not of paramount importance to her personally. Somebody else should do those things. Annie, like Shallcross (2008) was more concerned with a fundamental question underpinning EfS: what is it that should be sustained? It was the interlinked biophysical systems of the Earth, supporting all life, which had to be sustained. For Annie, that meant that people had to understand the links, and, to care. For Annie, the school's drive for improved literacy and numeracy results was nothing to do with care and development of the whole child emotionally, socially, physically, creatively. Annie may well have felt disenfranchised.

Annie also showed that she held a concept of a whole school approach to sustainability (Henderson & Tilbury, 2004) and an understanding of how this could work. She did not claim to have all the necessary skills and interests for EfS, but rather saw EfS as a team effort where different people had different expertise:

Interviewer: Given your experience, what have you learnt about EfS?

Annie: Getting everyone on board would help a lot. If everyone understands just a little bit and maybe little bits of different parts of EfS. Because there are a lot of people who are really good at audits and that sort of thing whereas I'm more interested in the plants and animals. So if everyone in the school took on just a little bit, I'm not saying the whole thing, then the kids would benefit a lot because there are different things that they are going to identify with as well [An:int:5.4.09].

Annie had clear ideas about what needed to be done. Not only should EfS be a team effort, but for EfS to be meaningful, there had to be action as well: 'you can actually start doing something and it will be more meaningful'. As with the children however, teachers first had to be aware that there was a problem and invited to act upon that awareness.

Annie held specific views about how EfS could fit into curriculum:

Annie: You can tie them all in together. With all the resources. It's not like an extra subject. You can just incorporate it into what you're doing. So if you're doing an English text type you can just use environmental resources where the students are gaining both at the same time. Awareness of how to look after the

environment and of their effect on the environment as well as the text type. And it makes it more real life anyway. Because it's a real life issue [An:int:5.4.09].

She maintained that there were advantages in placing environment at the centre of teaching and learning, because it was 'real life'. Providing curriculum that is significant to the lives of students is a fundamental principle of the NSW Quality Teaching framework (NSW DET, 2003) along with Queensland's Productive Pedagogy approach (Education Queensland, 2002). Whilst others in the school saw environmental work as having value for children's learning, and some acted sincerely on their environmental interests, none appeared to share with Annie a sense of teacher identity so deeply imbued with environmental thinking.

9.7 Annie's perspective: personal motivation and confidence

As a teacher, Annie was asked:

Interviewer: Do you feel more motivated or less motivated to engage with EfS than you did a year ago?

Annie: More motivated.

Interviewer: Why?

Annie: Because of my experiences with the students, and the obvious need for it [EfS]. There is a need because the children are unaware and they have no exposure to natural places [An:int:7.4.09].

Annie had realised that similar experiences to her own were absent from the lives of many if not all of her students. Knowing this she felt more motivated to provide them with a rich experience of their own place so they would come to understand 'why they need to conserve and sustain those places for future generations and their own enjoyment as well' [An:int:T3].

As Annie perceived it:

Annie: They don't realise when they're trampling on the plants they just think it's out of bounds they're not realising that it's a garden.

Interviewer: And is this something you want to address?

Annie: Yeah I want the children to feel more ownership for their school grounds, to have some pride and care for the plants and animals and then maybe that will extend to each other [An:int:7.4.09].

These strong desires motivated Annie to try to teach in a way which she believed would foster children's care for their place. Annie was motivated also by the positive benefits she identified from EfS:

Annie: I've learnt that the kids really get a lot out of it [EfS]. There's a lot of point to it. And it gives them team working skills, and more care for themselves and the environment around them [An:int:7.4.09].

Annie may well have felt dispirited by the principal's advice to set aside 'extra-curricular things' and to concentrate on her literacy and numeracy program [An:int:7.4.09]. It was evident, however, that she maintained a belief that EfS, as she interpreted it, should be a part of her teaching and that it would be of benefit to the children in her class. Although her frustration was evident, she claimed that her motivation was still high and her actions as reported below indicate that not only her motivation but also her confidence to engage with EfS were maintained.

9.8 How did Annie respond in this context and why?

Annie responded in accord with the principal's direction to focus her attention on literacy and numeracy. She participated in stage planning meetings and accepted the assistance of other teachers in her stage to program mathematics, spelling and grammar 'just to keep the peace the for the first few terms' [An:int:7.4.09]. In deciding 'just to keep the peace', Annie was displaying strategic compliance (Flores & Day, 2005).

However Annie showed determination to implement her ideals regarding EfS and the creative arts. As a first step she adopted classroom routines that expressed attention to sustainable use of resources. Consistent with her ideas she ensured that children had the opportunity to understand why there were routines for paper recycling, turning off power and sorting organic waste for composting and worms:

Annie: We know about recycling and composting just through our everyday practices. And we know why we recycle for the trees because we've looked at where paper comes from.

Interviewer: So was that an investigation you did through your English program?

Annie: Yes. We don't leave lights on unless we need them. They know about saving energy. We have lots of talks at assembly about composting and our

worm farms so they know about worms and what they can and can't eat. So they sort scraps for the worms and what doesn't go to the worms goes to the compost. So they know about those things just by the routine [An:int:6.4.09].

In line with the NSW DET *Policy* (2001a) which requires integration of environmental education topics and issues to support outcomes in other syllabuses, Annie helped children to gain field knowledge of biodiversity through content selection for English. She chose narratives that helped children to learn the names and ecological preferences of native animals:

We've done our information reports on frogs. They all chose a different frog for themselves then researched it themselves to find out as much information about it as they could. They had to collate the information into categories. Then they wrote the information report. We did frog descriptions before that [An:int:6.4.09].

This integration was not incidental for Annie, but rather it was purposeful in the sense that the children's field knowledge thus gained, contributed to creative arts and other activities described below. Additionally, Annie employed another form of curriculum integration suggested in the NSW DET *Policy* (2001a). In particular she addressed outcomes specific to environmental education in the science and social science KLAs through units of work she was required to teach. In the following example based on the social science unit *Wet and Dry Environments*, the relevant learning outcome is that students should 'demonstrate an understanding of the relationship between environments and people' (NSW Board of Studies, 1998:42). Annie demonstrated that she could comply with the stipulation to use this kind of integration of environmental education into curriculum while at the same time making use of the notion of action competence.

Jensen (2002) explained how, if people were to become action competent, it was important for them to understand the notion that they could hold a vision of a more sustainable future that could be sought through change. Annie described how she developed this aspect of action competence through her work in both English and the social science unit *Wet and Dry Environments*:

Annie: With built environments as part of the dry environment we looked at change over time. They looked at texts like *Window* and there they can see how the environment has been built up to accommodate humans and how that's good

and bad. So we used the picture book to support the idea of change in a place [An:int:6.4.09].

Later, Annie organised a creative arts activity that allowed the children to express a vision of their desired future:

Annie: And in art we did felting to represent our environment around us. I asked them to create a wall hanging of what they would like in their environment and that's what they came up with [An:int:6.4.09].

Consistent with her belief that children's learning should be 'real life' and include learning in the community, Annie ensured that the visioning activity was well supported in advance with experiences in the local area:

Annie: We studied *Wet and Dry Environments* so they know about wet environments and life cycles in that because we took them to the [EEC]. They looked at little creatures and birds and plants and animals.

Interviewer: Please tell me where the felting work fitted into your program.

Annie: Our topic was *Wet and Dry Environments*. The children were asked to design a wet environment and a dry environment that would show that the plants and animals were living in harmony without any pollution or rubbish from humans or anything but that showed there was still some human impact in the picture. So you could see that people had done something. And that's where they chose to show the grape vines because that's their local environment and a lot of them come from those families. So they chose to show the grape vines and then they had a water source being the river coming out of the mountains and a dam or pond. And they had a water cycle happening because they had a cloud for the rain. They understood the rain falls down on the mountain and into the earth and that's where the river water comes from. And we did a bit of work on how all water goes to the sea and how the sun evaporates some of the water and it goes back up to form clouds. And then they had some animals in the pond and they had some native flowers growing around, bees pollinating and birds. So we talked about the role of birds and insects in pollination. I don't know if they got it but we talked about it. And that frogs need a healthy environment to live in so they did a pond [An:int:6.4.09].

Ostensibly this was a creative arts activity. Annie however was using it for multiple purposes. The children were expressing a vision for their local environment, but in so doing they were drawing upon their everyday local knowledge of relationships between people and environment and also more specific knowledge of interrelationships between animals and environment as explored during the EEC visit. The final artwork was created through a process of reflection, consensus and sharing, consistent with principles of EfS (McKeown, 2002):

Interviewer: So the felting piece you did with these children was it one piece for the class?

Annie: They had to do a design so they all have a design in their books. And they had to write a description about their design. Then we put all the designs together and found the commonalities between them and some ideas such as somebody wanting to have a sunset. So we just collated them all and came up with a class design that everyone was happy with and then we just worked on that. And everyone made their own little bit. And from that, those things that are in our vision are in our class wall hanging.

Interviewer: I seem to recall from the *Wet and Dry Environments* unit there's a section about human impacts.

Annie: Yeah. So we had to talk about the natural trees and how it was before Europeans came and then what has happened afterwards with the vineyards and now how we can we try to make it so that the plants and animals and people can all live together.

Interviewer: And I saw the children's books yesterday where they had to identify natural and built elements of the environment.

Annie: So the discussion behind that was already in place.

Interviewer: Would there have been any activity that identified why people cleared the land, what was their purpose?

Annie: Yes to make a business and to make some money. And growing grapes is what their expertise was [An:int:6.4.09].

Through the felting activity, Annie was encouraging these young students to 'read' place; to understand connections between elements of landscape; to understand change in landscape; and to understand human relationship with place. Through visual arts, Annie was encouraging children to develop a 'sense of place' (Noone, 2006:225) just as she herself had done at age nine.

As well as using a variety of activities to help children understand the natural and cultural landscape around them, Annie understood that if EfS were to be an accepted part of her teaching, and if consideration for environment were to be a part of community thinking, she needed to raise the profile of this kind of work:

Interviewer: And you entered the felting into a competition?

Annie: Yes it was in the local art show and it was commended [An:int:6.4.09].

Once again Annie was acting in response to her own principles, in this case the idea that the school was a part of a wider community, and that good teachers should welcome opportunity for children to participate in the activities of the community. This principle is commonly espoused in EfS documentation, often as a

recommendation for networking or development of community partnerships (ADEH, 2005; Breiting, Mayer & Mogensen, 2005; Flowers & Chodkiewicz, 2009). Additionally, through organising for the children's work on an environmental theme to be a part of the local art show, she was demonstrating another kind of curriculum integration as required by the NSW DET *Policy* (2001a): in this instance she exploited a special community event to enhance student learning outcomes related to environmental education.

Annie was being pressured through the actions of the stage teaching team and the school executive to teach in a manner of their choosing. Annie however, had her own ideas and aspirations and was determined to bring about change. She began with a proposal:

Interviewer: So when you said 'proposal', this was a folder that you took to Geoff. Were you asked to create this folder?

Annie: No.

Interviewer: You just did.

Annie: Yep

Interviewer: You had ideas. And you presented them to him?

Annie: Yes. Before I showed him the environmental folder, I did the proposal and spoke to the assistant principal for advice. She said if you want to get something approved you need to go through the hierarchy, not step on any toes, get the teachers' approval before you go to get his [the principal's] approval. So that's why I then gave it to Mandy and Veronica and I gave it to the Jess and I gave it to him as well. So they all had a copy. So it wasn't just one person's decision, yes or no [An:int:5.4.09].

Annie's proposal was for a vegetable garden, and involved a different style of teaching from that being promoted to her in the school:

Interviewer: In your view, should maths and literacy, be maintained as discrete subjects, do you think that is necessarily the case?

Annie: No. I think it would make it a lot more enjoyable and interesting if you could tie it in with other subjects. Make it more webbed. For example in my proposal I said there's lots of maths and English to be gained from doing these outdoor things and with the vegetable garden, your text types are all there. Recounts: writing down what we do. Narratives: writing a story about it. Maths: calculating how many rows, how many seeds in each row, growth, length, measurement.

Interviewer: So you're describing an approach to learning. Is that different from what I am hearing that you're being asked to do?

Annie: Yeah. Because that's a bit 'out there' and they'd rather the children were in class with counters and pencil and paper.

Interviewer: The nature of the proposals: are you being extremely proactive?

Annie: The proposal was for a vegetable garden that could be used as an outdoor classroom by anyone at any time [An:int:5.4.09].

Annie's conception of EfS was for everyone to be involved. She was proposing development of a resource (the vegetable garden) that in her mind, everyone could use in their teaching. She believed in rich experiential teaching and was prepared to encourage others to adopt her methods.

Annie expanded on her vision for more integrated EfS and experiential learning in the school:

Annie: Well I've started by writing the proposal and saying what it would help with and how it ties in with the curriculum and how it would help children to build certain skills. Then by suggesting ways of using the garden the teachers can see it more as an educational resource and see it being used in the school and actually having a productive outcome. Once that's going, teachers would be able to do little projects for example you could ask them to make an ad for the school newsletter advertising our vegetables. It would only take them a few minutes but then they would feel a part of it. And then maybe they themselves would have an idea of an environmental project. I think creating projects and getting them involved is important because I know that just putting news articles in front of them about the environment doesn't work. I know that the principal has done that and Simone has done that as well with Earth Hour newspapers. There wasn't enough for all the staff and she was worried about it. But she put them on the table anyway and only about three of them were taken. So there's lots of stuff out there but the teachers aren't taking it so it needs to be pushed in their face but not really quickly. It has to be slow [An:int:5.4.09].

Indeed Skamp (2009) reported a similar finding, that encouraging people to use features such as the garden (a learnscape) in their teaching was a slow process. It required careful planning and demonstration. Annie wanted more participation in EfS. She was learning about some of the constraints to this happening.

Her efforts met with the following response from the principal:

Annie: I just put a collection of things that I was interested in doing into a folder and took it in to show him. And said "Would you be interested in supporting me to do these things?" and I showed him the folder and he didn't even really look at it.

Interviewer: And this was the plan for the vegetable garden?

Annie: Yes, for a vegetable garden, a compost heap, a worm farm and a chook run.

Interviewer: And on the basis of your experience you distributed that plan amongst several people?

Annie: Yes.

Interviewer: And did you discuss it with them?

Annie: Yes. And they just looked at me over their glasses and didn't really say much, just took it [An:int:5.4.09].

However, Annie, an early career teacher and into her tenth week of teaching at this school was not easily deterred by the response she had received:

Annie: I did submit another proposal to Geoff, that at some stage would we be able to create a vineyard at the back of my classroom, between the classroom and the oval? And I know that the Year 3 kids study harvesting so it would be useful in their work and also in the study of the seasons for younger children. That was another thing that came out of it [the *Wet and Dry Environments* study]; the kids wanted to know if we could make a vineyard. But I didn't have the resources or money or time to do it just there and then. So I put it to Geoff and he said, "Yeah yeah. That sounds like a good idea". So that's a project we might do at some stage [An:int:5.4.09].

This example demonstrates once again, that Annie saw projects in the school yard, not only as an opportunity to provide students with a sense of agency in bringing about change for a more sustainable environment, but as relevant in many ways to existing teaching programs in the school.

Annie's EfS practices are matched against Tilbury's (1995) definition in Table 9.1. The table shows that every part of Tilbury's (1995) conceptualisation is represented in Annie's work. Furthermore Annie included in her teaching the four kinds of knowledge required for action competence (Jensen, 2002). Specifically, her children explored the local issue of biodiversity loss through study of the immediate area as well as comparison with more natural environments during an EEC visit. These science and social science studies were complemented through their English program. The children were given an opportunity to express their values towards place through poetry writing [displayed work] and their vision of the future through creative arts [displayed work]. Finally the children were able to take positive action in terms of sustainability through planting of vegetables and fruit trees [observation].

Table 9.1 Coherence of Annie’s actions with Tilbury’s definition of EfS

The definition of EfS used in this column is adapted from Tilbury (1995).	Annie’s actions
EfS has relevance in that it deals with contemporary issues of concern to learners who are encouraged to explore links between their personal lives and wider environmental and social concerns.	Children in Annie’s class explored links between their food supply and impacts on the surrounding environment eg clearing of vegetation and transport.
EfS has a holistic curriculum base in addressing environmental issues and in teaching and learning, identifying the whole picture surrounding an issue.	Annie applied all elements of Jensen’s (2002) model showing four kinds of knowledge required for action competence.
EfS not only teaches about values but also teaches values, in this case ‘an environmental ethic which has sustainable living at its core’; highlighting ‘the importance of valuing the interrelatedness of the web of life and promot[ing] the principal value of concern for all life forms’ (Tilbury, 1995:201).	Annie demonstrated and focused her teaching on a strong environmental ethic with particular reference to the web of life. She ensured that children in her class followed classroom routines that reflected an environmental ethic.
EfS is issues-based wherein students ‘consider matters of fact, values and morality’, to allow for an ‘exploration of moral, social and political values required for the development of an environmental ethic’ (Tilbury,1995:202).	‘We looked at change over time. They looked at texts like Window and there they can see how the environment has been built up to accommodate humans and how that’s good and bad. So we used the picture book to support the idea of change in a place’. ‘So we had to talk about the natural trees and how it was before Europeans came and then what has happened afterwards with the vineyards and now we can we try to make it so that the plants and animals and people can all live together’ [An:int:6.4.09]
EfS is action-oriented, both in encouraging learners to personally and collectively take actions towards sustainability, and in promoting the use of active teaching and learning strategies.	Children in Annie’s class planted trees and vegetables and visited several places beyond the school for the purposes of investigating the surrounding environment.
EfS involves critical education, that is, an education that develops socially critical and political literacy skills, necessary because of the social complexity of environmental issues.	Annie encouraged children to reflect upon the way in which the places they visited were being used. Through creative arts she encouraged children to envisage the landscape as they would like it in the future. The way that she encouraged children to develop an understanding of change over past, present and future as well as her questions to them about ‘plants and animals living together’ may represent initial steps in critical thinking for these young children.

The above description of Annie's activities shows that she held a sophisticated understanding of EfS that was in many ways consistent with the interpretation presented in official documentation such as the National Statement (ADEH, 2005) and the NSW DET *Policy* (2001a). She planned for curriculum integrated projects and sought the assistance and involvement of other people, within and outside the school. Although it appears that in many ways she failed to entice others within the school to engage with her vision of EfS, she was not thwarted in her ambition to continue.

9.9 What enabled and what constrained EfS for Annie?

The above account exposes the constraints and opportunities that the workplace offered Annie in terms of EfS. Her capacity to engage with EfS may have been facilitated by the fact that there were experienced teachers in the school who were able to express understanding of the processes and advantages of EfS, even though there was only some evidence that this was being acted upon by them. Mandy's remarks indicated that she supported Annie's ideals, and her plans eventually gained approval from the principal ('Yeah, Yeah. That sounds like a good idea').

In addition, Annie's activities in EfS were enabled by a community that was prepared to assist her in a variety of ways. The children were very knowledgeable about matters such as what happens to waste materials, why waste was a problem and how it could be avoided [observation]. The fact that environmental matters appeared to be discussed at home [Je:int:6.4.09] and that there was some approval and interest regarding environmental teaching amongst the community made it easier for Annie to proceed. The capacity and willingness of the community to provide material resources also contributed to her EfS efforts.

However the greatest facilitator towards Annie's progress in EfS was her own vision and determination, coupled with a capacity to reflect upon the culture of the school and then adopt specific strategies that she identified as serving her EfS purposes. These strategies included establishing her worth within the school community. Examples include conforming 'just to keep the peace' and showing she could 'master [their way] before I go and do my own thing'. She also was prepared to follow

established procedures such as writing proposals and sharing her ideas with relevant others. She knew that it was important that her activities made the school 'look good' and for her to gather strength and support from those beyond the school gate.

Contrasting with these considerable advantages, Annie was working in a school culture characterised by an entrenched orthodox view of education as 'silo' curriculum with emphasis on externally and narrowly defined accountability measures. This could serve as an example of what Stevenson (2007:265) described as a culture that works 'against inquiry-based, action-oriented environmental practices'.

Nation-wide testing of literacy and numeracy means that schools and the teachers working within them can be held accountable for the performance of their students. It is for this reason that many schools are directing extraordinary efforts into ensuring the best possible results for their students. The testing regime of itself entrenches the 'silo' organisation of curriculum, meaning the teaching of the relevant two KLAs as discrete subjects. This is especially the case as large sums of Commonwealth money are simultaneously being delivered to 'low performing' schools in a National Partnerships Program (Australian Government Department of Education Employment and Workplace Relations, 2010) under which it is specified that recipient schools will use specific prescriptive teaching and learning programs in each of the two relevant KLAs. The notion of a 'silo' curriculum is in this way further cemented and by implication sanctified as the best way forward. Given this kind of curriculum organisation, any teacher, such as Annie, who wishes to implement a more 'webbed' approach in line with contemporary thinking in EfS and in line with the dimension of significance from the NSW framework for Quality Teaching (NSW DET, 2003) will likely be frustrated.

Principals in NSW schools are being pressured by the regional and state DET hierarchy to improve the performance of their students in NAPLAN tests. It is hardly surprising that principals, such as Geoff, interpret the road to better performance as 'more' of literacy and numeracy; that any principal whose school is performing well should be proud of that result; and nor is it surprising that any principal will feel compelled to chase improved test results. In this situation Geoff could well feel

justified and secure in his curriculum prioritisation for the school, but this same prioritisation was a constraint on Annie's aspirations to deliver a rich, student active and locally relevant curriculum for her students.

According to Scott (2007:67), the second stage of development of a school towards sustainability is one where 'school leadership has accepted the idea that a broad view of sustainability needs to be taken seriously in relation to the school's curriculum' and provides 'active leadership' drawing in staff, students and the community. This was lacking at Yarramalong and therefore Annie's ideas were not being nurtured and her creativity and energy harnessed, towards an innovative approach to sustainability education.

As well as the lack of leadership in the school, in terms of developing a whole school approach to sustainability, Annie's efforts were constrained by the attitudes and determined actions of other teachers in the school, who adopted the accountability orthodoxy or who simply held other interests. In particular the assistant principal, Jess, who although claiming to hold values for schooling beyond academic performance, applied most pressure on Annie to adopt the same methods as the other Stage 1 teachers. It was Jess who expressed the greatest determination to secure the best possible test results through the advocacy of specific teaching methods, in specific subject areas. In this way Jess's powerful position in the school acted as a further constraint on Annie's activities. Similarly Annie's perception that there was limited attention to environmental matters in staff room talk left her feeling that she had few allies to support her interests.

9.10 Links between what Annie did and teacher preparation

It has been reported that several factors contribute to teacher identity (experience as pupils, teacher education, influence of significant others and the school context), but that the relative strength of each in contributing to teacher identity varies according to each new teacher's personal pathway and workplace conditions (Flores & Day, 2005). Annie's personal history contributed substantially to her identity as teacher, before she began tertiary education. Given that many of her goals as teacher seem already to

have been established, she attributed the main impact of EDSE 412 as development of pedagogical content knowledge:

Annie: I didn't really know how to get it across to the students. I guess I would have been able to go into class and talk about why places are special and that we need these certain places but I wouldn't have had the background to actually teach and I wouldn't have known about the inquiry approach and what the quality teaching things are like deep knowledge and deep understanding [An:int:7.4.09].

In particular she appreciated experiential learning and the use of real materials in the classroom. The things she most appreciated were:

Annie: Just those real life projects. So where we got the kids from [the local school] and those studies you had in the class where you brought in the seed pods and we actually got to look at them and understand about them. And when we went on the excursions [An:int:7.4.09].

Annie was consistent in her view that if people are going to learn about the natural world, then they should experience it first-hand.

Annie expressed a constructivist outlook, believing that her goal in teaching was the development of the student as independent learner:

I think we learnt that a lot in the 412 unit. We learnt lots of different ways for students to pick a topic and it gives them more ownership of their own learning. So they can say "I learnt that", not, "the teacher taught me that" [An:int:7.4.09].

She combined this teaching goal with her view of the importance of learning from the 'real' world:

Interviewer: Is there any particular thing that you've done that you've actually learnt from those pre-service years?

Annie: The project, the inquiry learning project where I worked with the children on biodiversity in the garden and then we did some planting. The real life things in the classroom so where you go out and collect the leaves, feeling snakeskin and doing an art work on it. Not just using pictures but using concrete materials. I really took that away. I guess the notion of doing excursions and getting out there in the world and seeing it for yourself and getting the kids to make up their own ideas about things and not just be told all the time [An:int:7.4.09].

The inquiry learning project (ADEH, 2005) gave the pre-service teachers the autonomy as learners which Annie believed she should give to her young students. Indeed her work as early career teacher demonstrated this outlook on teaching. When all of the teachers in her stage team were asked to organise children to write a report

on frogs, other teachers gave children the required information and demonstrated how a report should be written. Annie however chose to use a different method. She asked her students to identify a species of frog which interested them, then research that frog for the written report. Displays of children's work showed that, because of this, the children were learning not only about one frog, but that there are many kinds of frog and that each kind has its own particular habitat requirements and other relationships with its environment. For Annie it seemed that providing learners with the opportunity to gain experience, and affording them the opportunity to follow their interests, were of primary importance.

It was common for the students of the EDSE 412 class to claim that they enjoyed the field work component of the unit. This may well have been because the field work was social, practical and novel. For Annie, however, out-of-class work was the very essence of learning and must be used for specific learning purposes:

Interviewer: But you're telling me that one of the issues that you have to face [in this school] is convincing other people that EfS is worthwhile, and that the way to do that is to show how it benefits the children through the curriculum. Does that tell me that we really should be doing more work on curriculum connections in teacher preparation?

Annie: Yes, but I think that's how you do it. By doing the practical activities. So when you go out on an excursion, ask the uni students to do a recount or a description. Get them to do diagrams and to measure things and show them how it ties in with the curriculum [An:int:7.4.09].

Annie believed that the university students should experience the kinds of activity that they themselves could deliver as teachers. The experience however had to be closely tied to ways that the students as teachers could later deliver EfS:

Annie: You know how at [the national park] you gave us a worksheet to do. I think if they actually created their own worksheet. With English and maths activities that had to be done and then go out and actually see if they themselves could do it. That would be a great way for them to say "Hey I made those activities and I can get an answer from them".

But I think they have to use their syllabus for English and maths and I think we did that. They should have those in class all the time. And they could have some kind of tally or reward system if they can see relevant outcomes or if they can see a relationship with an outcome. If you show them how to do it then they'll remember it, and they'll use that in their practice and they won't have to work it out themselves [An:int:7.4.09].

Although effort had been made to link the activities of EDSE 412 with an integrated view of the primary curriculum, Annie believed there was a need for the connections to be forged more strongly, with pre-service teachers finding syllabus links, developing and actually trialling activities themselves. Her emphasis on practice of programming tasks linked with actual activities for the primary class could not be stronger; pre-service teachers should experience the preparation, experience the place, do the prepared activity and if possible teach the activity, with curriculum links explicitly sought throughout.

One of the reasons that Annie was such a strong advocate of experience as the basis for learning was because it was teaching experience during her pre-service teacher years, which gave her confidence to implement a similar approach as teacher. As intern (T3), Annie reflected on EDSE 412:

Interviewer: So how has 412 influenced what you are doing in school?

Annie: Biggest impact was the experience of being able to teach that group of kids that came out to the uni. That definitely made it real to me. Actually having that group of kids and being able to do that for my assignment proved to me that I was able to teach it with children and be able to relate it to things we did in class as well.

Interviewer: Can you talk about different aspects of that teaching experience?

Annie: I had to do the research and find out the background information that I needed and then speaking to educators and other people in the community to make it to a year one level proved to me that I could learn it and that it's important to teach to students so they can utilize the information and share it with their parents as well. I just found it a really enjoyable and rewarding experience. And I found that students were really engaged with the materials that I created [An:int:T3].

The opportunity, during pre-service education, to gain experience of the kind of teaching that Annie desired to adopt, was of greatest value because it gave her the confidence to implement the same strategies in school.

As with other early career teachers Annie was anxious to have good resources on hand:

I wish I had time to be able to find resources or have lists of resources to use, children's picture books and so on. Because otherwise it's just things you

happen to come across. But if there was say a resource list for English, how you tie it into EfS, if that was already there [An:int:7.4.09].

The sustainability unit had been delivered through the science team of teacher educators. Although attempts had been made to deliver resources useful for integration across the KLAs, this example from Annie strongly suggests that curriculum integration of EfS in English tasks could be better explored by the English curriculum team of teacher educators at the university. Annie's argument supports initiatives towards mainstreaming EfS in teacher education (Ferreira, Ryan & Tilbury, 2006, 2007b), rather than leaving it as the responsibility of one specialist group, and improved resources for broad curriculum integration are now available (Littledyke, Taylor & Eames, 2009).

Annie's practice linked strongly to strategies and ideas explored in EDSE 412. Given the strength of her early convictions, it appeared that EDSE 412 offered Annie mostly an affirmation of her intentions. EDSE 412 also, as an interpretation of the realities and aspirations of contemporary EfS in NSW, provided her with strategies that added to her confidence to proceed.

Chapter 10: Tony

10.1 Tony at Terrace Lake Primary School

At the time of case study investigation, the beginning teacher, Tony, had had one full year teaching Year 2 at this school and had begun his first term of teaching a second Year 2 class. His first Year 2 class had included some students who were well known in the school for confronting behaviour. Tony admitted to being challenged by those children, but in the year of the investigation he was very much enjoying a class of mostly happy and interested individuals.

10.2 Context of the school

This school is located beside a river which is used for recreational purposes. Some houses separate the school from the river. The riverside homes are well established and sought after. To the north of the school is a busy arterial road and beyond that are areas of government subsidised housing and the small dwellings of a former mining community.

The school is quite new although some old wooden buildings are still in use as classrooms. The grounds are attractive with shady trees, well kept lawns and some native gardens. A large tank collects rainwater used for flushing of toilets.

With a total enrolment of less than 300 students, this school had over six mainstream classes and several support classes for children with special intellectual needs. The largest class has 30 students. There are ten Indigenous students and none who use English as a second language. The principal described the community as generally coming from a low socio-economic background with considerable unemployment, and having limited educational experiences and consequently:

Typically new Kindergarten students arrive here with poor social skills, reduced language skills and limited experiences with books and literature [SMP 2009-2011],

He believed that there was a mix of backgrounds amongst the families. Although mining activities have now moved away from this traditional mining community, many of the families still find employment in mine-related industries and power stations. Unemployment remains high in the area and many children come from single parent families [An:int:9.3.09].

Only some families show an interest in the activities of the school. The principal was unable to identify any families who had a particular interest in environmental activities and no parent or community groups were involved in environment-related activities in the school. Indeed:

A large number of parents prefer limited involvement with the school. It is generally difficult to engage parents in reading groups, canteen volunteering and parent information sessions [SMP 2009-2011].

None-the-less, as principal, he believed that the Parents and Citizens group as a whole had some interest in environment. Tony, as a beginning teacher, found this school community to be quite different from those in the less urban districts in which he had previously worked:

It's just not like a country school. We don't know the community that well. We don't see parents out helping at the weekend doing activities in the school [To:int:8.3.09].

Joy, Stage 3 teacher with ten years experience in this school similarly felt that the parent community did not have a strong presence in the school. When asked what she thought local people valued, she replied:

Joy: Survival really. I don't know what they value. I don't think they value education very much. Some of them do. A lot of them don't. It's hard to know sometimes. Sometimes I think it's survival for a lot of them from week to week.

Interviewer: Can you tell me anything about the expectations of people?

If you're talking environmentally, I'd say for most of them it's not something that's an issue really [Jo:int:9.3.09].

Under these circumstances, there appeared to be no community pressure for the school to engage with environmental projects. No individual was offering to write submissions for funding, pursue business and local government support or offer specialist gardening or other skills as happens in some other schools. Given this general culture of 'non-interference' by parents, it could be challenging for the school, should they endeavour to undertake environmental projects, to gather resources and

support from the broader school community, in the manner suggested through the NSW DET *Policy* (2001a) and the SEMP model.

Despite these views, it was possible to identify individuals from the community with an interest in environment. Tony was able to nominate one such parent for interview. She proved to have a strong interest and to be appreciative of any environment-related education provided by the school [Pa:int:10.3.09]. However, overall parent involvement was not strong, and substantial encouragement and assistance for environmental projects not apparent.

10.3 School culture

School culture refers to the norms and patterns of interaction that occur within the school. In particular reference will be made to routines, the approach of the principal and professional tasks that teachers are expected to perform.

When asked what they thought was important in this school three teachers gave a similar response. From the relieving principal, Andrew:

Engagement of the students and improved learning outcomes. We've got three target areas which are literacy, numeracy and welfare. Welfare at the moment. Leadership and behaviour management we are focusing on, to maintain a high standard of behaviour [An:int:9.3.09].

Mitch, Stage 2 teacher, elaborated on this a little:

Mitch: Departmentally the most important thing is the literacy and numeracy. That's their big push. And our big push, a lot of it is to do with student welfare and wellbeing. Because the community is a bit of a fractured community from extremely wealthy to extremely poor. And there are a lot of welfare issues with the children. So that's a big concern of ours [Mi:int:10.3.09].

Mitch identified the focus on student welfare as the school's particular local need. The need for interest in behaviour issues is explained in the School Management Plan:

In 2008 there were 21 suspensions compared with 4 in 2007. Teachers and students have reported that the major factor affecting school culture and student and staff morale is poor student behaviour [SMP 2009-2011].

Similarly:

Student attendance rates have been lower than state rates for the past 8 years. In 2007 the attendance rate was 92% compared with 94% for the state [SMP 2009-2011] [SMP 2009-2011].

Remarks from Cath, who taught one of the classes for children with disabilities, touched upon a special quality, evident from the conversation of several people in this school:

Interviewer: How would you describe the culture of the school? What's important?

Cath: Just trying to get the kids to care for each other. I find the children here accept other people. They accept my children. We have four special education classes and the kids are so accepting of those.

Interviewer: So in this school you find the children very accepting.

Cath: Yes they are. Whereas in other schools not as accepting. Harder for the kids to mix. Even though some of my kids have behaviour issues they still take them on. And they want to know them, they want to talk to them, they want to be part of their class. Teachers are very accepting of them too. So a very accepting culture, very caring [Ca:int:10.3.09].

For Cath, the pressure for academic performance of the kind driven by NAPLAN was not so important, but she was deeply appreciative of the culture of caring that supported her work in the school. Tony, however, along with Andrew and Mitch believed that the school's first priorities were literacy, numeracy and NAPLAN results, in addition to that of establishing a positive culture of social responsibility, and engagement of the wider community.

Emphasis on improvement in NAPLAN results is not surprising, given that students in the school were performing at a lower level than state averages and there would be external pressure on the school on this account:

NAPLAN results in 2008 were below state rates for Years 3 and 5 in literacy and numeracy. Growth rates in 2008 were above state averages for numeracy and slightly below state averages for literacy. It should be noted that all of the Year 3 and 5 students who have intellectual disabilities sit the NAPLAN tests, which affects the overall result [SMP 2009-2011].

Despite being below state averages, the school could be proud of its achievements given rates of improvement (growth rates) and the fact that this school had classes for special needs children.

It is admirable that under circumstances of less than encouraging academic results and the identified behaviour management issues, the teachers interviewed demonstrated a cohesive view, characterised by a determination to bring about positive social change in the school. In this sense they provided excellent role models for Tony as an early career teacher.

Particular arrangements in the school reflecting environmental activity

Nobody mentioned environmental matters as being a priority in the school. However Tony identified his supervisor, Cath and the principal, Andrew, as being people with an environmental interest. When asked about environmental projects in the school, Andrew responded:

We don't really target that as such. We've got water tanks to try to reduce our consumption and we've got a submission in for the solar schools to put panels on the roof to help our supply, and if it works out, to augment the grid. We've had groups of people planting around the playground. But it's not a priority. Oh we recycle paper [An:int:9.3.09].

This information shows that the school had responded over recent years to large Commonwealth grants offered to schools to improve sustainability of energy and water use through improved technologies. Sustainability however was not a *curriculum* priority and the main environment related practice involving students was paper recycling.

Stage 3 children were required to place large paper recycling bins in a particular location for council pickup. However their responsibility and ownership of additional new initiatives for recycling was limited:

Interviewer: Who do you think, when you have the new recyclables bin and the time comes to teach all the children how to use that bin for their milk cartons and things, who do you think could take on that role of promulgating the information?

Cath: Probably here all the staff do it. Here if we say we're going to do something, we're pretty good and most of them will remind the kids. We could get the SRC to promote it with signs and to speak at assembly. So it's usually a whole school thing [Ca:int:10.3.09].

Cath described this as a 'whole school thing' but staff would take responsibility for 'reminders': there seemed to be no decision making role provided for students, and no particular environment-related role for students outside the SRC. Indeed when asked

about the extent to which children were encouraged to engage in decision making in the school, Tony maintained that it was limited to the SRC and their focus was on 'little fund raisers'. Andrew agreed that student decision making was restricted to raising money for particular things and admitted that there definitely was potential for the SRC to move into the environmental area [An:int:9.3.09].

Tony identified recycling as a normal part of wider community life, something encouraged and supported by local government services. As evidence, he explained:

Tony: I think kids all know what recycling is and they've all got their yellow top bins at home so they're all pretty aware of it. I collected bottles last year to make boats and the kids all told me they raided their recycling bins at home so it's part of the community. I think it's part of everyday life [To:int:8.3.09].

Tony's remarks were reiterated by Mitch:

Interviewer: What about in their lunches. Is there a lot of packaging there?

Mitch: No not really. They're pretty good. A lot of food comes in the lunch box itself. It doesn't have the plastic film wrap or the secondary packaging. They eat a lot of fruit here. And the canteen is limited in what they can sell. And they recycle a lot of plastic containers or they clean them and reuse them. So we're pretty good like that [Mi:int:10.3.09].

This in itself was a whole of community achievement, and the support of the school an integral part of maintenance of this positive aspect of community attitude.

Cath maintained a vegetable garden with her special class and the children used their produce for cooking activities. Cath also maintained a compost and worm farm with her children. Her efforts however had been frustrated in the past by vandalism, the children's pumpkins having been stolen. These gardening activities were for the special classes, and other children in the school were not requested to sort their waste for the worms or compost.

Another environmental initiative for the school was celebration of Earth Hour, organised by Tony. Tony explained the reasons why staff had decided to support Earth Hour:

Tony: We've noticed that a lot of teachers are walking out of their classrooms and leaving lights on and I'm guilty of that as well.

So we're not making a big deal of it. We're just making everyone aware of it and hopefully by telling kids, they can remind the teachers.

We did it last year and the kids were good for a while and I'd be walking out of the classroom leaving the lights on and they'd be going 'Mr Lavery, the lights are on'. So they'd be quite good [To:int:8.3.09].

It seemed that conserving energy was regarded by teachers as a good thing to do. However, once again children held minimal responsibility, being given a role as 'reminders to teachers' who by implication were the ones with real responsibility for energy conservation.

At the beginning of the year the school participated in Schools Clean Up Australia Day as is common practice in NSW primary schools. Mitch organised student activity on this day. He reported that the school yard and the surrounding public areas were quite clean, that the children were happy to do the clean up, offering no resistance to the task. From Mitch's point of view, 'the message is largely getting through' [Mi:int:10.3.09].

Environment and curriculum

Tony described the organisation of Earth Hour celebrations in the school, repeating his emphasis on awareness raising:

I'm organising the Earth Hour event this year for our school. I did it last year as well. But they didn't want to make it a big deal. We just wanted to mention it and turn off our lights for an hour. We'll select a few light monitors in the school and they're responsible for that day for turning the lights off every time they go out of the classroom. We're just trying to be more aware of it [To:int:8.3.09].

Once again, although Earth Hour was being celebrated in the school, its importance was minimised. There was no mention of how it could be incorporated into curriculum or how it could be relevant as an energy conserving initiative for more than one day.

With regard to Clean Up Australia Day, the message about how to handle waste may have been 'getting through' but Mitch largely dismissed the suggestion that understanding about how generation of waste was connected to purchasing decisions could be an effective part of student learning:

Interviewer: Do you think anybody's trying to approach the waste issue from the point of view of what we consume and choosing to purchase products which are going to generate less waste? Do you think that's part of what people do?

Mitch: To a degree. But these children, they don't do grocery type shopping. So they wouldn't take the message. They wouldn't see a product until it's served up to them. They don't do that. Parents do the shopping without them while they're at school. So it would be a fairly hard message to get across. Very few things would come packaged to them. [Mi:int:10.3.09]

It could be argued that Mitch was not thinking deeply about the issue, given the material resources that would be used by families over and above grocery shopping, and given the children's annual experience of Clean Up Day, where the most common rubbish located came from MacDonald's take away food store near the school. The central notion of consumption choices as being at the heart of much of our unsustainable practice appeared to be not on his teaching agenda. This was quite surprising given that other responses had shown Mitch to be a reflective teacher who thought about the broader issues of education. Additionally he had been identified by the kindergarten teacher, Fay, in a discussion about care and responsibility for the environment, as a teacher who was meticulous in demonstrating environmental care.

Given that a teacher such as Mitch appeared to overlook an essential underlying principle of sustainability (consumption/waste links), it seems likely that this principle would not be addressed in his teaching. This example demonstrates that broad principles such as this, and strategies to teach them, could fruitfully be offered for teacher professional learning.

The above examples show that the incorporation of EfS into curriculum was the responsibility of individual teachers and was therefore interpreted in individual ways. The school as a whole acknowledged community environmental events such as Clean Up Day and Earth Hour but whether or not these events were a part of the formal curriculum of the school was entirely at the discretion of individual teachers who were otherwise pressured to focus their effort elsewhere. This was the normal place for EfS in this school and therefore this was the example of a teacher's role in relation to EfS that was available to Tony.

Environment related views of the principal

The relieving principal, Andrew, had been a stage 3 teacher in the school just one term previously. He held an interest in environment:

Andrew: My class are going to participate in Waterwatch later this year. Last year we went down to the lake and studied the foreshore and the sea grass and what made a healthy foreshore. The council came and did that for us. The kids loved it. We do a regular monitoring of the wetlands. We do monitoring once a term. We enter our data into a national database and we can use that for maths [An:int:9.3.09].

Andrew indicated that he held an interest in sustainability in his personal life. At school he identified environment primarily as a tool for connecting children with learning and meeting KLA outcomes, and secondarily as important in itself:

Andrew: I mentioned engagement before. I think the environment is a great tool to engage the kids. You can do lots of literacy and numeracy and use current issues, and environment is something children know about. It's all around them. And it's probably something we need to equip the kids with knowledge and skills in [An:int:9.3.09].

As relieving principal, Andrew shared the priorities of the NSW DET indicated through emphasis on school NAPLAN results:

Andrew: I think our school plan takes priority. The SEMP has to sit below those goals. Literacy and numeracy are paramount. So the pressures of raising our standards in those areas take up most of our time. So the SEMP sits below them [An:int:9.3.09].

For Andrew, the best ways to encourage teachers to make EfS 'a bit more a part of what we do' would be to show how it could be integrated into curriculum: 'then teachers would be more confident, and think they don't need an extra hour in the day'; to give them a 'bit of knowledge of how they can use environmental education to help improve the outcomes we're trying to reach anyway'; to provide encouragement by showing how EfS is engaging for children; and to facilitate EfS by suggesting strategies and resources teachers could use ('I think what teachers need is practical ideas') [An:int:9.3.09].

As a classroom teacher, Andrew recognised the role of EfS in an integrated curriculum, but as a newly appointed relieving principal, he was not necessarily

promulgating this message to staff. Andrew explained that the staff as a whole analysed NAPLAN results for mathematics and English, and planned to target identified areas of weakness. However when it came to environment:

Andrew: As far as environment goes at the moment, it's people working individually. We've got recycling going but really that's a Stage 3 thing and everybody just throws their paper in a box [An:int:9.3.09].

Within this school, the processes of collaborative planning of curriculum were in place for numeracy and literacy but the notion of collaborative planning of sustainability as a part of curriculum was not in operation. There was no indication that people were opposed to EfS. However there were pressures on the school to attend to other matters. EfS was seen as something addressed by individual teachers, and as an 'add on' rather than as a positive part of school culture:

Andrew: I'd say that [environment] is an area we're pretty slack on. Probably generally schools are. But we don't put much of our professional learning money into it. I guess literacy and numeracy are our core business and that's where we spend most of our money, that and QT [Quality Teaching]. Maybe some people see [environment] as a separate thing which I probably do as well. See the environmental over there and here's the stuff we have to do. And do it if there's time [An:int:9.3.09].

Environment related views of other teachers

Two of the teachers who were interviewed sought opportunities to integrate environmental concepts and activities into their teaching. Fay taught the youngest children in the school but she was determined to find ways of integrating EfS into her work:

Interviewer: In terms of their environmental learning, what do you think [the children] need?

Fay: Well an awareness of what the products are doing as well what happens when they're not disposed of properly. I love the literature books like *Lester and Clyde*, you know the frogs whose water hole becomes polluted. My favourite is to teach that unit. It's a great way to push that thing about pollution, what the problem is if we don't recycle. I say, "Do you want our school to look polluted like this?" Out in the playground we reward the kids, if we see a kid just go and pick something up. No one has asked them and it's not theirs. We reward them. It's a way of saying, well done you care [Fa:int:10.3.09].

For Fay, everyday human activity was a source of environmental problems, understanding about this should be ‘pushed’, and caring and teaching children to care were very important. Fay did this by relating issues from children’s literature, to the children’s own experiences. However Fay used far more than children’s literature in her environmental teaching.

Articulating the view that positive environmental attitudes should be part of teaching from the earliest age she found direct ways of making her reading program relevant to children’s experiences and ways to use these experiences for environmental purposes:

Fay: I guess that impacting on the kids at this early age, it’s such a key time and as a kindergarten teacher, everything that you do they take on. So it’s the key time to teach it. So I like to model it and do it from the very beginning. So the paper bins are down in here. I get the kids to do that. If they’ve got things from their lunch like PET bottles I take them home and put them in my recycle.

Interviewer: And do you ask them to think about what they might give you to take home?

Fay: Yeah. We read what’s printed on their bottles or containers. So that’s just a really nice easy way to bring in that discussion every day [Fa:int:10.3.09].

In her effort to imbue a culture of caring and careful environmentalism into her classroom, Fay went to the lengths of taking home recyclable material that children brought to school, and which could not be recycled by the children given the facilities available there. In so doing she presented herself strongly as a positive role model for responsible behaviour reported by Chawla and Cushing (2007) as an important quality in environmental educators. She was also using a recycling focus and items from the children’s everyday surroundings to teach literacy.

Similarly, Cath, teacher of children with intellectual disability, chose curriculum integration as a way of including EfS in her work. Cath was genuinely concerned about the environment of the future:

We’ve got generations to come after us. Including my little one. What’s the world going to be like for her? [Ca:int:10.3.09]

In her teaching she identified that environment-related activities could be integrated to serve her broader curriculum goals:

Interviewer: You’ve got the vegetables growing over there so just tell me how that fits in with what you do.

Cath: We used to do cooking. Kids were getting bored with that so I said to the lady I was working with, “How about we do cooking one term and gardening the other term. Just to break it up”. The kids took to it. We got a worm farm. We went out to the local [commercial] worm farm. We would go out there and chop the food up for the worms. Then it lead to the planning of the garden, preparing the soil, getting the worm wee and putting it on and they thought it was great, something happening. So we decided to keep a log of what was going on so it was incorporated into English, their writing. But also [in] measurement, their maths. We haven’t weighed the pumpkins yet but we will in maths. I guess for my children it was just hands on life skills. They get so excited because they’ve grown these pumpkins. But it’s good. It’s something they’ve achieved. And hopefully after we’ve weighed them we can make pumpkin soup and pumpkin scones [Ca:int:10.3.09].

Cath did not explicitly state that, for her, teaching ways of living more sustainably was her goal. However, her skilled curriculum integration provided an excellent example for others in the school to see.

Cath acknowledged the difficulty of programming for EfS in mainstream classes where the pressure for improved literacy and numeracy skills was most keenly felt. Mitch, for example, Stage 2 teacher, perceived EfS as ‘not a priority’ in this school [Mi:int:10.3.09]. He interpreted EfS as:

leaning towards renewables rather than expendable type things. I think we’re talking more of just a care of our surroundings and our impact on it. Lessen your impact [Mi:int:10.3.09].

For Mitch it was important to foster positive values towards the environment. He appeared to be unhappy about pressures on teacher time, maybe resentful about a lack of control over planning, but also resigned to a prescriptive curriculum as an expectation to be fulfilled, rather than describing opportunities to innovate as did Fay and Cath:

Interviewer: What do you think holds back the implementation of the environmental policy?

Mitch: Time. And other people who consider that their barrow to push is more important. Because we have to try to do everything here. I find that we’re doing a lot of things but we’re only doing them at a fairly shallow level. Like at the moment the big push is the literacy and numeracy for the NAPLAN test. So forget everything else. Then you’ve got the health issues too with the PE and healthy eating. We’ve got that as a big priority too. And then technology, we’re supposed to be learning how to use the whiteboard. So we don’t do a lot of things to their full depth. Four and three quarter hours we’re on the chalk with the kids. And a huge chunk of that has to be literacy and numeracy. Along their

guidelines. It doesn't leave much. And PE is supposed to take 2 hours a week. That sort of thing. And you need to take out scripture and you take out this and you take out that and it's a limitation [Mi:int:10.3.09].

Stage 3 teacher, Joy, shared with Fay the practice of trying to relate wider environmental understandings to the lives of children in her class:

Joy: My kids watch *Behind the News*. And there's often an environmental issue, global warming is probably mentioned every week. And so we use that as a discussion focus and relate it to what we have around here. The older kids can understand that. But it's not something that's happening on a regular basis to be quite honest. We pick up the papers in the playground but we don't do much gardening. It's not something that happens very much at all I think [Jo:int:9.3.09].

Joy's description could be interpreted as 'ad hoc' EfS (Butler, 2009:8), and this, according to Butler (2009), would simply not achieve the goal of preparing young Australians for a changing future. Joy, as did others, accounted for the ad hoc nature of environmental discussion by referring to the supremacy of literacy and numeracy performance in driving school activity:

Literacy and maths are our big focus because our NAPLAN results are not as good as they could be and the NAPLAN push is what you hear about and environmental education I suspect is at the bottom of the pile [Jo:int:9.3.09].

However, when asked what constrained EfS in the school she responded: 'Time. Time and just not thinking about it really'. 'Not just thinking about it' could be a reflection of the fact that EfS was simply not in the school plan and not on the professional learning agenda within the school, not much a part of the conversation or expectation of what it was that teachers should be doing and therefore not thought of as a part of the culture of the school.

Joy seemed to feel some frustration with her work:

Interviewer: But if I said to you as a teacher teaching young people like this, what's important?

Joy: It's not that [NAPLAN results]. I'm always in trouble because I'm the person who's saying: "We should be giving these kids a broad well rounded education". Like I really want to take them to the [city] show for example where they get out and meet some animals and they find out where their meat comes from. They've got to understand that if they do *this*, then *that's* the effect of it [Jo:int:9.3.09].

Joy's remarks suggest that she questioned the manner in which literacy and numeracy were prioritised in the school and that her attempt to do so met with 'trouble' rather than change. As with Mitch, she referred to 'the nagging that we get. English results are not good enough. Maths results are not good enough'. In her view 'teachers didn't see [environment] as important' [Jo:int:9.3.09].

It seemed that teachers such as Mitch and Joy felt inhibited by the prioritisation of literacy and numeracy and the way in which it curbed their desires to do other things. They desired greater freedom to express a sense of environmentalism through their teaching. All of these teachers demonstrated at least one aspect of Tilbury's (1995) conceptualisation of EfS, and that was a strong ethic of environmental care that they wished to convey to their students. Some teachers provided positive examples of ways of including environmental investigations in their teaching and some were prepared to adopt a critical stance regarding common practices in relation to resource use. Lacking however within the culture of this school, as it was being experienced by Tony, were notions of empowering students to adopt a view of the future to which they could contribute in a positive way, through planning and action in the environment. Lacking also were experiences for Tony of collaborative planning around EfS issues.

10.4 The beginning teacher's views of EfS as pre-service teacher

Motivation and intention

As a pre-service teacher, Tony's primary interest in teaching stemmed from his interest in working with children and a particular desire to help the 'kids who struggle' [To:int:T2]. He was enthusiastic to start and 'wanted to do things' [To:int:T2].

At the beginning of the university EfS unit (T1), Tony ranked his desire to include EfS in his teaching as 'very strong'. However at T2, during interview, Tony's perception of his earlier view had altered, and he described his pre-EDSE 412 desire to include EfS as not so strong, attributing this ranking to the fact that he 'didn't really know the problems'.

By the end of the university EfS unit (T2), Tony rated his motivation to include EfS in teaching to be once again ‘very strong’ but on this occasion described a change in view, attributable to new knowledge and a sense of optimism regarding the potential of teaching and EfS:

Interviewer: Rank your motivation to teach EfS from one meaning not much to ten. Where would you put EfS?

Tony: Probably before this course maybe 4? 5? Because I didn’t really know. But now that I know the problems associated with the environment; after my project, problems just on landfill and things like that: 8? 9? It is a fairly serious issue and little things can make a difference. And that’s really good to know that individually, knowing that just as an individual you can make a difference. Yeah right up there I think [To:int:T2].

This ranking during interview corresponded with his written survey responses recorded at T2. His reason for strong motivation at T2 was that ‘many individuals can make a difference and it would be great as a teacher to see this difference taking place’ [Surv B:T2].

For Tony, learning about the details of environmental issues and knowing that there were positive actions that he could take fuelled his motivation towards EfS. He went on to explain that prior to the EfS unit he

didn’t really consider [environmental impacts] at all and also you don’t really think about where things come from or how they get here so it’s really woken me up to that fact that we are damaging the environment [To:int:T2].

Tony explained his motivation towards EfS as arising, in particular, from realisation of the environmental impact of his own life. In this way, he was expressing a capacity and willingness to be critical of everyday practices. In particular he attributed this to the major assessment task of EDSE 412, the inquiry learning project:

Interviewer: What contributed in a positive way to your motivation to teach EfS?

Tony: Inquiry learning for a start. That was great. I was used to just chucking stuff in the rubbish and I’d never think about it. Now it’s totally different. It [the inquiry learning project] did make a difference. And I took the changes about handling waste to work as well. They waste heaps [To:int:T2].

He also attributed his interest to a prior strong appreciation of school geography. This subject matter, with its field work orientation, interested him and he anticipated that children also would find learning in the environment engaging:

Tony: Yeah I'm very motivated to go out and teach it. It is an area that interests me and pretty much always has been the case so I think it's something you can teach and the kids will enjoy it as well [To:int:T2].

Tony's ranking of motivation as 'very strong' at T1 may have been emanated more from his admitted interest in matters geographical than from a realisation of his personal impact on environment. However at the end of his pre-service years, Tony's thinking was firmly oriented to his future career and of what he could offer the children in his care. EfS seemed to be a part of his identity as teacher.

Confidence

As final year pre-service teacher, Tony expressed confidence in his general ability to address EfS in his teaching. From the written surveys, he ranked himself, at the beginning of the university unit (T1) as 'confident' on the basis of his interest in environment, but this had increased to 'very confident' at T2 on the basis that 'the course EDSE 412 has provided me with knowledge and exposure to important issues. I feel that this knowledge that I have, can be successfully incorporated into the primary classroom' [Surv B:T2].

Consistent with this survey response, Tony claimed in interview, that his confidence stemmed from his interest in the subject matter, from new concepts that he had learnt, from knowing practical activities that he would be able to use and additionally, from greater familiarity with official documents:

Interviewer: And your confidence to teach EfS? What makes you feel you are able to do that?

Tony: All the explanations you've given. And some of the activities you've conducted with us. A simple one with the worm farm. That was a good one.

Just some of the concepts you've given us. Ecological sustainability and things like that. That I really hadn't thought of too much.

Interviewer: So giving you a framework for thinking about it?

Tony: Definitely yeah and being able to use the documents as well that the Board produces and things like that [To:int:T2].

More specifically Tony nominated the inquiry learning project used for assessment in EDSE 412 as contributing to desire to teach and to confidence. For Tony, confidence in many ways appeared to be bound up with interest, of envisioning a way of ‘giving it a go’ and knowing that EfS, and what he found interesting about it, were a legitimate part of his role as teacher.

None-the-less Tony could identify specific areas where his confidence wavered:

Tony: Jensen’s model I don’t think I’d be able to do that really because I don’t feel I have a good grip of it yet. It probably needs a bit more as far as my confidence goes for teaching with it. And cooperative learning: do you mean working with other teachers?

Interviewer: I mean where with water you worked in groups with other student teachers, and did a presentation.

Tony: Yeah. I don’t know if I would be able to conduct a lesson with little groups. Probably once I had my classroom strategies right. Probably just because I haven’t had enough practice [To:int:T2].

As might be expected at this time, where Tony was about to enter the final stage of teacher preparation (the internship), he felt uncertain about his ability to apply particular programming skills and teaching strategies. These particular skills are foundational in EfS as it is interpreted in NSW documentation. As an example, Jensen’s model can be used as a tool for facilitating integration of curriculum around a sustainability issue and for planning to provide students with the skills and outlook of ‘action competence’. Similarly, group work as a teaching strategy is an important entry point to collaborative action towards sustainability. Tony’s insecurity suggests that modification to strengthen these fundamental skills in the presentation of the EfS unit, as well as other units of the BEd, should be considered.

As might be expected, given the findings of Tschannen-Moran and Hoy (2001), Tony, although indicating an overall high level of confidence, expressed uncertainty in a specific content area (climate change) on the basis of lack of knowledge but he felt secure about teaching water related topics on the basis of his familiarity with water issues.

10.5 Tony's perspective: school culture

Tony had been welcomed into the school and felt that he was being 'well looked after and supported' [To:int:10.3.09]. He was able to identify that the relieving principal, Andrew, and his supervising teacher, Cath, shared an interest in EfS. After more than one year in the school he did not nominate either Mitch or Fay, thought by others to have an environmental interest, suggesting that he may not have been actively canvassing other teachers for ideas for environmental work. There could be reasons arising from the culture of the school, one being that environmental matters did not form a part of the school's agenda for professional discussions. He was well aware of the priorities of the school, and these priorities comprised the bulk of programs of professional learning [SMP 2009-2011]:

Interviewer: What flavours the school?

Tony: NAPLAN, literacy, numeracy

Interviewer: And you feel that they are the priorities?

Tony: Yeah they are [To:int:8.3.09].

When he was asked about conversations that occurred in the staffroom:

Interviewer: Could you go in there and talk about environmental things?

Tony: No, not really

Interviewer: So where does the staffroom talk go?

Tony: School, kids

Interviewer: And do you think they're innovative teachers? Are they looking for new ways?

Tony: No, they're pretty set [To:int:8.3.09].

This conversation suggests that another reason for Tony not recognising the environmental interests of Mitch and Fay could be that environmental matters were simply not discussed in informal communications amongst staff. It is quite possible that discussions surrounding teaching did not occur amongst staff of different year levels and so he simply did not hear about what others were doing. For these reasons it may be that the environment-related views of personnel in the school were not particularly visible except where they included tangible projects such as Cath's vegetable patch.

Added to this was a sense that everybody, staff and the wider community, simply prioritised other business:

Interviewer: Do you feel free to express environmental views?

Tony: Yep. Our staff is supportive. Anything I want to do they're supportive of, but trying to get help is another story.

Interviewer: And there are no families that are clearly interested?

Tony: Not that I know of. I don't know the community that well because I don't live in the community. No one stands out. Few parents come in and do things. You find the same parents come in for reading [To:int:8.3.09].

Apart from the apparent lack of environmental concerns on the school's agenda as reported by Tony and others as well, there were particular arrangements which limited the curriculum-related decisions of the beginning teacher. Several examples follow, the first referring to a trip that Tony had organised for his Year 2 class the previous year. (Tony refers to 'COGs' which is explained below.)

Tony: We pushed for it, because the principal Andrew is quite environmentally minded as well, we pushed to go to [the local EEC] and look at the natural ecosystem. And the kids got a lot out of it. They really did. They learnt about building shelters and the different fossils and dip netting and they had a ball. But other than that one day activity there wasn't enough and there wasn't really any follow up on it either. So next time we go hopefully we can work on doing a bit of follow up.

Interviewer: Tony why was there no follow up?

Tony: Time again

Interviewer: So it didn't slot into what you were doing?

Tony: No it didn't. Well that's the problem I'm having. We do COGs. So we don't have that flexibility to do a unit on the [local EEC].

Interviewer: Let's say you wanted to do more environmental work, not necessarily a big project, but so there was a green colour around your classroom, what would frustrate your efforts?

Tony: Time. And COGs is my biggest limitation. I would prefer to put more effort in and do my own units in science and HSIE. And get rid of COGs. And I'm trying to do that.

Interviewer: And so are you allowed to do that?

Tony: I've still got to teach COGs. I do it two afternoons a week and I do science one afternoon [To:int:8.3.09].

COGs (Connected Outcomes Groups) was a voluntary scheme offered to schools, wherein published units of work, which purportedly addressed all outcomes in all KLAs but excluding English, mathematics and physical education, could be followed by the school. In this way the COGs scheme relieved the school of the task of formulating a scope and sequence of study that ensured the required comprehensive curriculum. Schools who adopted the COGs scheme were known as COGs schools and some appeared to quite happily use the centrally prepared material, tailoring it to their specific needs (pers.comm. B. Townsend, teacher, March, 2009). Some teachers however were critical of the content of the COGs sequence and still others were frustrated in so far as they felt limited in their ability to follow their own interests and those of their students. Tony experienced this latter frustration. Following his own interests in teaching meant trying to squeeze those interests in as ‘an extra’. Moreover, for both mathematics and spelling, Tony was required to follow text books, copies of which were provided for each child [To:int:9.3.09].

In summary, Tony interpreted the culture of the school as welcoming, conservative in its literacy and numeracy-dominated approach to curriculum, prescriptive of substantial elements of curriculum (social science, science, mathematics, spelling, creative arts) and not antagonistic to environmental matters, but definitely too busy elsewhere to include something that could be avoided if possible. When it came to the environment, it seemed people were avoiding it with the exception of particular individuals who pursued their own interests and values in this area. Under these circumstances, Tony’s achievements, to be described below, were substantial.

10.6 Tony’s perspective: personal motivation and confidence

Interviewer: With regard to EfS, I’m trying to assess the degree that you feel you want to do something about it.

Tony: Motivation is quite high but being able to do it is almost impossible [To:int:8.3.09].

This statement by Tony is consistent with his written survey ranking of motivation, at this time, as ‘strong’ [Surv C: T4]. He still believed that EfS was an important part of his job, but he felt limited in what he could do. Twenty months earlier, as pre-service teacher and at the completion of the EfS unit of study, Tony was imbued with a sense of the importance of teaching environmental concepts and of giving children a sense

of positive capacity to act in favour of the environment. As a teacher, he went on to say:

Tony: There's no time. But I would love to do it. All the free moments last year I tried to do it. I tried to get in and do a garden and things like that. And I told you about all the plants being stolen [To:int:8.3.09].

Tony had worked hard on a lunch time project to create a garden in the school yard. However his frustration was evident, not only as result of conflicting priorities in his role as teacher, but also as a result of the plants having been stolen soon after planting. In spite of these frustrations, he appeared to have maintained an interest in EfS:

Interviewer: Why do you think you want to do it? I understand the frustrations but why do you think you want to do it?

Tony: Because I think school is meant to be fun as well. Going out into the environment and doing things in the garden is fun. And without the kids even knowing they're doing work they're actually learning a lot [To:int:8.3.09].

His motivation here, appeared to pivot around student engagement ('fun') and the recognition that outdoor projects potentially provided a productive learning environment. The social, emotional and physical, as well as cognitive benefits of learning out of doors have been reported (Malone, 2008; Ballantyne & Packer, 2009) and Tony appears to be sensitive to these.

In his survey response, made as early career teacher, Tony remarked that 'there is not enough EfS and students are not aware of the environment' [Surv C: T4]. The dual notions of EfS for the purposes of engaging children and EfS as being an intrinsically important part of teaching (there's 'not enough' of it) seemed both to be held and this is consistent with Tony's earlier (pre-service teacher) views.

As pre-service teacher, Tony had expressed his strong motivation towards EfS on the basis of his environmental concern, and his anticipated role as a teacher who could do something about the environment through teaching. He had also as pre-service teacher expressed his desire to work on outdoor projects with children. However, as could be expected, given the findings of Flores and Day (2005), there appears to have been a change in emphasis or maybe in conception of which if any aspects of EfS are important, now that Tony was working in a school. Given the culture of disinterest in environment that the wider school community offered and the prioritisation of other matters within the school, Tony appears to reflect upon the garden building activity,

not in terms of environmental learning, but in terms of the social learning goals which were the original intention of the garden project and a particular personal interest of his as pre-service teacher. It could be implied from this observation that, if pre-service teachers are to maintain their motivation to include EfS in their work, they need opportunity to develop a stronger conceptualisation of EfS, to formalise that conception through overt expression, and to use that conception more rigorously in programming or teaching tasks that will support their later work. None-the-less, a spark of interest was still detectable for Tony and he did pursue other environment-related work with students in the school.

It can generally be anticipated that beginning teachers will initially focus their attention on skills such as lesson planning, presentation, teaching strategies and discussion techniques (Frid, Redden & Reading, 1998) and Tony mentioned early concerns in these areas. A teaching strategy such as outdoor investigation is commonly advocated in science and in environmental work (Ballantyne & Packer, 2009). This strategy requires particular expertise as Tony explains:

Interviewer: Conducting investigations outdoors. Do you do much of that?

Tony: Not really. But I wasn't confident last year because of the class I had. This year I would definitely be more confident because as you saw today, they can listen well. Even if they are off task, it's not something that's disruptive. So I would be confident to take them outside [To:int:10.3.09].

Tony was expressing the reported view (Simmons, 1998) that working outdoors, beyond the familiar, cued context of the classroom, can add to class management problems and how this constrained his confidence. Through his extra-class activities however Tony was gaining much experience and with a more manageable group of students in his second year, was experiencing increasing confidence in his capacity to teach outdoors.

However Tony's written survey remark as an early career teacher shows that his confidence in EfS overall had diminished with his experience of the job: 'Having to fit so much in I don't feel as though I could teach it properly'. Tony had maintained a sense of the importance of EfS, but after five terms of teaching, his was a case of diminished motivation and confidence.

10.7 How did Tony respond in this context and why?

Much of Tony's environment-related teaching has already been described. This is because much of his environment-related work has been not within his class but rather in the context of the wider activities of the school. This in itself shows how willing Tony has been, despite curriculum-related frustrations, to engage in the life of the school over and above his core classroom duties, to take on 'extras'. The garden building activity was primarily to fulfil the student welfare priorities of the school:

Interviewer: So the children were engaged in digging and planting and watering?

Tony: Yes and that's really good experience for them. We were hoping to get more environmental awareness out of it if we kept it going but the plants were stolen. But the immediate goal was just to get some hands on activity going.

Interviewer: And did the activity calm those children?

Tony: Oh yes, definitely and they loved it. It gave them something to look forward to and they saw it as a privilege.

Interviewer: So it was Andrew's idea?

Tony: No. A behaviour person came into the school and gave Andrew the idea. Then Andrew discussed it with Tracey and I and we said, 'Yeah, great idea'.

Interviewer: So he approached you?

Tony: Yes [To:int:9.3.09].

In this example, an activity which might otherwise be construed as 'environmental', and which may indeed have achieved some of the goals of the NSW DET *Policy* (2001a), really had other purposes in the manner discussed by Gruenewald and Manteaw (2007). However Tony was satisfied that the planting had served its social purpose, giving participating children pleasure and raising their self esteem.

Tony's determination to provide the children in his class with learning experiences *about* the environment and *in* the environment was demonstrated, when he took the children to the local EEC. However, as mentioned, he admitted that he had failed to integrate that rich experience into his teaching program:

Interviewer: Will I find EfS in this program?

Tony: In here? As I get better, as I get better at incorporating things in, I'll definitely include EfS in my program. But at the moment I'm just trying to fit in reading and maths and spelling [To:int:10.3.09].

Indeed there was no mention of environment in Tony's program; nothing relevant in the children's books or in the displays on the wall. As noted before, here Tony is attributing the lack of EfS in his teaching program to the pressures he was experiencing to focus on reading and mathematics in line with the priorities of the school. Similarly with regard to the EEC field trip, he attributed the lack of integration of this experience into his program, to the school's insistence on use of pre-written COGs teaching units. These are external pressures and expectations that he felt obliged to fulfil.

In discussing his teaching program, Tony described a unit of work he had taught on the topic of frogs:

Tony: We did a project on frogs last year. And I put that into English. And we wrote about the life cycle of frogs, the things they ate and what their environment was, where they lived, what they lived in, those sorts of things.

Interviewer: That was through your English program?

Tony: Yes solely through my English program.

Interviewer: So the children were reading about frogs?

Tony: Yes we did.

Interviewer: Well that's English and that's science concepts but in what way would that be EfS?

Tony: I don't know. Well it was because we talked about the draining of the wetlands. We talked about the environment and about the lovely houses by the water that actually wiped out the swamp where they all used to live.

Interviewer: So is that EfS?

Yeah. So I'm guessing I'm doing a lot more without even realising it. Yeah it is. It definitely is [To:int:10.3.09].

In this example, Tony included as part of his science work on living things, a discussion critical of human destruction of local habitat. Tony could not locate where EfS was written into his teaching program, and the above conversation where he is reflecting tentatively on his work, suggests that a conceptualisation of what might be a part of EfS had not been uppermost in his mind. At school level, there was no SEMP, no requirement for him to think about how EfS could be a part of his teaching program, and no requirement for it to be written into the teaching program. In these circumstances, it is not surprising that events such as Clean Up Day, Earth Hour and

the journey to the EEC were not developed as core learning opportunities as is strongly advocated in the NSW DET *Policy* (2001a), but rather viewed as add-ons for some other, albeit valuable, purpose.

Tony felt confident about the garden project:

Interviewer: And confidence? Do you feel quite confident include EfS?

Tony: Yes definitely. The garden idea came from my internship school at West Public. They had a garden club and a brick laying club. They built a little wall and things like that. So I learnt a lot from a teacher called Sarah [To:int:9.3.09], and he made a determined effort to take the children to the EEC. He knew that these were positive experiences for his students and he was gaining valuable skills and confidence in teaching outdoors. However without careful planning of concept and skill development, these experiences were unlikely to enable children to learn about interconnectedness between human activity and the biophysical environment, to develop an understanding of the processes of planning for the future, of how to engage the assistance of the broader community and of taking responsibility for actions in the environment.

Tony's notion of EfS was explored further:

Interviewer: What is the most important thing for children to realise and to learn from their experiences such as Earth Hour and Clean Up day?

Tony: To realise and recognise that the environment is a fragile thing and should not be taken for granted. That everything we do has an impact in some way.

Interviewer: So you're telling me about values?

Tony: Yep, definitely. I think anything more complex than that, especially in my class which is a Year 2 class is too much. So just to know that what they do does have an effect. That's the thing I'd be trying to get through to my kids [To:int:9.3.09].

Here Tony is expressing the view that children should value the environment and understand their impact on it. This latter component implies an understanding about the connections between choices, actions and environment. Thinking about these connections may have been relatively 'new' to Tony, who, before EDSE 412, 'was used to just chucking stuff in the rubbish and I'd never think about it' [To:int:T2]. He did not claim to have been brought up in a family or school situation where positive

environmental values were demonstrated and habits in everyday conserving practice appear not to have been established during his earlier life. Tony's opinion that this was all that should be attempted at Year 2 level is quite different from that of the kindergarten teacher, Fay. Fay seemed to encourage a deeper understanding of connectedness from her children, and certainly expected positive actions from them.

As mentioned earlier, Tony's conception of EfS also included the notion of children having fun in the sense of being engaged in outdoor activities such as garden building. Earth Hour, Clean Up Day and the garden activity, were conducted in way that suggested a view of environmentalism as disconnected from the curriculum. Tony was not seeking out curriculum links for his class nor seizing the opportunity to give children a sense of agency with regard to energy use. Tony mentioned that he had not been asked to plan learning activities around these events and he intimated that the school's intention was simply to 'raise awareness' [To:int:9.3.09]. In adopting the course of action which he took, Tony was fulfilling what he perceived as the expectations of others in the school. Environmentalism as disconnected from curriculum appeared to be an accepted outlook in the school and one that Tony duplicated in the class visit to the EEC even though he expressed regret that in terms of syllabus learning this was an opportunity lost.

As a pre-service teacher discussing the inquiry learning project [To:int:T2], Tony appeared to understand wider purposes of EfS: of being critical of everyday practices and of taking action towards sustainability. However during the early years of his teaching, there is only limited evidence that he implemented this conception of EfS. Rather, as might be expected given other reports of early career teachers, he shared some of the practices and values, and responded to the expectations of those around him in the school (Flores & Day, 2005; Wang, Odell & Schwille, 2008). Indeed Tony indicated awareness that there was a discrepancy between EfS as he conceived of it at the university and his practices in the school. When asked had he been engaging in EfS at this school, he responded that he had not [To:int:9.3.09]. In fact he had engaged with some aspects of EfS but he did not put forward organisation of Earth Hour and the gardening activity as examples of EfS. Perhaps these activities did not fit his underlying conception of how EfS should be taught. Rather it was in the lesson

Table 10.1 shows examples of how Tony’s actions and explanations cohere with the definition of EfS that has been adopted for this study.

The definition of EfS used in this column is adapted from Tilbury (1995).	Tony’s actions
EfS has relevance in that it deals with contemporary issues of concern to learners who are encouraged to explore links between their personal lives and wider environmental and social concerns.	Tony raised a number of relevant issues with his class but provided little evidence of extending children’s understanding to the links between personal lives and the issue at hand.
EfS has an holistic curriculum base in addressing environmental issues and in teaching and learning, identifying the whole picture surrounding an issue.	There was very little evidence of this. Certainly EfS was not programmed in any way. There was ad hoc and partial discussion of issues.
EfS not only teaches about values but also teaches values, in this case ‘an environmental ethic which has sustainable living at its core’; highlighting ‘the importance of valuing the interrelatedness of the web of life and promot[ing] the principal value of concern for all life forms’ (Tilbury, 1995:201).	Tony was not conscientious about demonstrating an environmental ethic as in turning off appliances in the classroom even though he had organised Earth Hour. Maybe this suggests that Tony had not reflected deeply on his own environmental ethic and his role as teacher in modelling environmental values. He did demonstrate care for living things through his teaching surrounding frogs.
EfS is issues-based wherein students ‘consider matters of fact, values and morality’, to allow for an ‘exploration of moral, social and political values required for the development of an environmental ethic’ (Tilbury, 1995:202).	There is no substantive evidence that this occurred in Tony’s work.
EfS is action-oriented, both in encouraging learners to personally and collectively take actions towards sustainability, and in promoting the use of active teaching and learning strategies.	Tony engaged students in Earth Hour, etc but in the absence of exploration of energy issues in the curriculum, the efficacy of this action is unknown.
EfS involves critical education, that is, an education that develops socially critical and political literacy skills, necessary because of the social complexity of environmental issues.	There is some evidence of this but critical education is not a planned and substantive element of Tony’s program

about frogs, where he was able to identify a critical stance within the discussion about the draining of swamps for housing that Tony identified that EfS was being taught. Perhaps Tony conceptualised EfS as critical and as curriculum integrated and these

elements had not been strongly developed in his work and therefore he denied engaging in EfS.

Tony's conceptualisation of EfS is shown as a summary in Table 10.1 that provides examples of how Tony's actions and explanations cohere with the definition of EfS provided by Tilbury (1995). Whilst the table summary suggests that in fact Tony participated in various elements of EfS, he was not pro-actively engaging his students with the issues and processes of sustainability learning in a manner that would enable them create a more sustainable future.

10.8 What enabled and what constrained EfS for Tony

Tony's teaching program and the children's work available in his classroom suggested that very little happened in his work in relation to EfS. However a study of the broader context within which Tony worked has provided a richer picture, one in which EfS had some place and one which has revealed the links between what Tony managed to achieve and the culture of the school.

For Tony, participation in EfS was enabled by the sympathetic outlook towards environment of the relieving principal; personal approval of Tony on behalf of individual teachers such as Cath and Joy; the positive and public example set by Cath; personal interest in environment of particular staff members; a conscientious and accommodating school groundsman [Gr:int:9.3.09] and favourable physical resources within the school. Although a number of other staff members and the parent community displayed disinterest, this attitude would have been less disconcerting for Tony than disapproval.

Enabling his participation in EfS were Tony's own personal interest and care for the environment. He was critical, somewhat unnecessarily, of his effort regarding EfS. However, in the discussion already reported, about frogs, Tony had in fact taken some initial steps towards integration of EfS into science work. Additionally, when questioned about integration into English, he responded:

Tony: Yes I have. I read them a book about going to the rubbish tip. How it was disgusting and where does it all go? How can we minimize that? We had a conversation about it but it was a brief session. I was pulling the text apart for

other purposes. But again that was where I should have taken the opportunity [To:int:10.3.09].

In this example he showed a capacity to use English work to develop EfS understandings and to broach the possibility of change and this was a strategy in which he had expressed interest in as a pre-service teacher (T2).

Constraining Tony's participation was the prioritisation of other aspects of curriculum to the exclusion of EfS. The advantages of curriculum integration using the environment as a localising agent and a means to engage children in learning across the curriculum was well recognised by the relieving principal and apparent in his own practice. However the external pressure for improved literacy and numeracy results drove a curriculum focused narrowly and directly on the skill development required for test results. Mathematics, spelling and other aspects of English were programmed by means of textbooks, and independently of whatever else children were learning at the time. Science and social science were also programmed independently and it was only through the personal interest of individual teachers that environment became woven into curriculum. For Tony:

Interviewer: Are there limitations or prioritisations that you feel influence you?

Tony: Just getting everything done in maths and literacy. It's hard. Sometimes I get rid of the art lessons to fit more English in [To:int:10.3.09].

Tony's activity in environmental work was also constrained by the silence surrounding environmentalism in the school, environment not being a part of general conversation and neither a part of professional learning programs nor of whole school planning. There was no SEMP for the school, no imperative or enthusiasm on behalf of the community for environment to be a part of curriculum and no mention of environmental achievements in two terms of school newsletters sent home to parents (school term 4, 2008, term 1, 2009). There had been theft of children's vegetables and of the native plants donated by local council and planted by children. Furthermore during his first year, Tony, whose view of EfS strongly embraced outdoor work, felt constrained by a class of children who were difficult to manage.

None-the-less, constraining Tony's inclusion of EfS was uncertainty in his own conceptualisation of EfS and what he perceived as his uncertainty in programming

(‘As I get better, as I get better at incorporating things in, I’ll definitely include EfS in my program. But at the moment...’[To:int:10.3.09]). The challenges of programming an integrated curriculum, as identified by Kysilka (1998) (page 26), seem to apply. Tony was not receiving assistance in programming for EfS [An:int:9.3.09]. There was no publicly recognised advocate and expert teacher modelling EfS, as described by Skamp (2009), in a way that would foster a beginning teacher’s learning. Within the school there was tacit approval of environment to be seen as an add-on, disconnected with curriculum and mainly to do with awareness raising. Under these circumstances it would be surprising if a beginning teacher were able to to achieve more in EfS than Tony had already achieved.

10.9 Links between what Tony did and aspired to do and teacher preparation

Tony had long held a strong interest in the surrounding environment and his confidence to engage with EfS had grown considerably. As a teacher he was able to link his confidence in working with others in the school and beyond to the EDSE 412 inquiry learning project:

Tony: Because that assignment really forced us to find the information. So now I know where to find the information. I know I can ring the council and get help and all that sort of thing which I didn’t know beforehand.

Interviewer: And confidence? Do you feel quite confident that you could?

Tony: Yes definitely [To:int:10.3.09].

Tony had demonstrated this independence and confidence in working beyond the classroom in several ways.

Tony made a determined effort to take his class to the local environmental education centre (EEC). Through the university unit, he knew about the EEC network and the services that the centres offered to visiting classes. Through the university unit also, he knew that the NSW *Policy* existed and that he had a responsibility to implement it:

Interviewer: What do you recall as the best parts of 412?

Tony: Getting out the policy documents. Until 412 I had never seen them. And we probably should have seen them before fourth year. Yeah, so going through those was pretty good.

Interviewer: What message do you think that sent you, going through the policy documents?

Tony: That we have to teach it. That it needs to be taught [To:int:10.3.09].

It is possible that knowledge of the mandatory nature of the NSW DET *Policy* (2001a) enabled Tony to lobby so strongly for the EEC visit. Tony remarked that pre-service teachers should have seen those policies before their fourth year of teacher preparation. The fact that the policies had not been a part of earlier units of study raises the possibility that no other tutors at that time were adopting responsibility for EfS. Ferriera, Ryan and Tilbury (2007b) suggest a mainstreaming model wherein EfS is a co-ordinated component of many of the pre-service units which constitute a teaching award. However, because EfS is disregarded in the stipulations of the NSW Institute of Teachers, there is no particular imperative for the university or the tutors to adopt EfS in teacher preparation.

Jensen's model of action competence was one tool used in the university unit to assist students with the process of integrated planning of EfS. It was used to construct integrated teaching units and to analyse and modify existing units. As mentioned, at the completion of the university EfS unit (T2), Tony was uncertain about planning for EfS and using Jensen's model. As early career teacher he was asked:

Interviewer: Do you remember Jensen's model?

Tony: If you reminded me I would.

Interviewer: Oh well, that's the model about the four kinds of knowledge that children need to experience in relation to environmental issues.

Tony: I don't think I ever really understood that [To:int:10.3.09].

Clearly the work using Jensen's model and programming could have been better managed by the tutors and new publications may facilitate this (Wilson-Hill, Law & Eames, 2008; Littledyke, Taylor & Eames, 2009). Lack of confidence in programming lead to frustration:

Tony: And that's the really frustrating thing. I really do want to teach it. I want to do a good job but the most frustrating thing is finding that I can't teach it as well as I would like. That's why I would like to know how to integrate it better [To:int:10.3.09].

From Tony's remarks it is apparent that his initial teacher education fell short in the area of programming skills. Programming of course is a complex task especially in the absence of a real class of children for whom the program is being written and in

the absence of opportunity to reflect upon the implementation of the programmed work. This is one reason why undergraduate experience in schools and action research prove to be so worthwhile (Maxwell, 2009). With only limited opportunity for this to occur in the sustainability unit, the programming tasks undertaken may well have been inadequate. It is possible that programming preparation needed to be detailed and very specific, ideally in the context of a specific teaching situation. This would help new teachers to develop their field knowledge of what was required for programming tasks.

Tony explained why programming skills were so important for early career teachers:

Interviewer: Thinking of the people still at university, what do you think is particularly important for the ones that are still there?

Tony: Being able to integrate EfS with their English. I was the same. At uni you think you've got all this time in the world. You can teach everything. But it's just not true. So maybe it's teaching them to be able to integrate it into English curriculum would be good. Because I know when I was at uni I had all these great ideas of doing these fantastic environmental projects. Unfortunately it's not like that [To:int:10.3.09].

For Tony, if EfS were to be a part of teaching, it had to be a carefully aligned part of the priority work of the school, an integral part of what was deemed most important.

At present schools in NSW are being encouraged, under the banner of Quality Teaching, to adopt strategies that make explicit to students the significance of their learning (NSW DET, 2003, 2006), and that emphasise intellectual quality. EfS as conceived for this project lends itself to Quality Teaching in that it is relevant in the lives of children, is holistic in its focus on environment, fosters student direction of their learning and is readily aligned with higher order thinking, and substantive and purposeful communication, as well as engagement with the notion of knowledge as problematic. Given the present political context of education, and despite this alignment of EfS with the elements of Quality Teaching, it seems that EfS will continue to be conceived as an 'add on' for enthusiasts, until schools become convinced of the advantages in terms of syllabus outcomes of using such strategies, with an environment focus.

Tony had in fact taken tentative steps towards integration of EfS into English, and he acknowledged a link between this activity, as reported above, and tasks undertaken during the university unit. It was only at the time of interview however, when asked to reflect, that he recognised that the class discussion about going to the rubbish tip could in fact have been construed as a part of EfS. When asked what he thought was particularly important for the students still at university, he replied: ‘I would like to see people know [about EfS]. See, I don’t even know when I’m doing it.’ This response suggests the need for pre-service teachers to be more strongly encouraged to reflect upon what EfS is for them and how it could be materialised in school.

As mentioned, even as early career teacher, Tony had engaged in the life of the school beyond his core classroom duties, undertaking tasks such as the garden building and later the school’s organisation of Earth Hour. A whole school approach to environment, central to the NSW DET *Policy*, (2001a) had been presented to the pre-service teachers.

Interviewer: That whole school approach, that’s a product that we promote in EfS in NSW. Do you think that’s a sensible approach or do you think we should abandon it?

Tony: I think in theory it’s fantastic. But now I’m actually out I know that it’s very difficult. Especially in a school like ours when we don’t get any duties off. So teachers, when they do have time off, they’re not willing to go out and help in the playground and do things like that. They’re not willing to because they’ve already had a duty today. Whereas if you had a week off you’d be more likely to do something for the school. That would encourage a whole school approach [To:int:10.3.09].

On the basis of his experience, Tony recognised a mismatch between whole school organisation and the pressures on teachers to focus on implementation of prioritised curriculum. In this school, where student welfare and social cohesion were a priority, Tony was encouraged to direct his energy and enthusiasm towards projects beyond his class duties, but in line with those priorities, rather than the priorities of EfS.

10.10 In what way did the beginning teacher engage in EfS and why?

This case has described the ways in which Tony has engaged with EfS in his early teaching career. This has been done by reference to Tony’s self reported activity, to the reports of others in the school and to documentation such as Tony’s teaching

program and children's classroom work. The description includes an analysis of Tony's environment-related teaching in terms of the interpretations of EfS offered by the literature. The case also offers explanations of Tony's decision making by reference to the context of his work situation and his earlier experiences, in particular as pre-service teacher. This analysis shows that Tony's EfS activity was constrained by the work context. In his view, it was also constrained by other factors such as by his deficiencies in programming skills, which therefore should be further developed in pre-service teacher education. In this way the case of Tony has contributed to an understanding of how beginning teachers engage with EfS and why and also to suggestions of how pre-service teacher education could be better shaped, to take account of the needs of early career teachers in EfS.

Chapter 11: Cross case Analysis

11.1 Introduction

The analysis has previously focused intensively on individual cases, and each case has explained the actions of a beginning teacher within a complex milieu. In this chapter, patterns and differences across cases will be identified and issues arising discussed. Illustrations of how particular phenomena occur in the differing circumstances of each case can provide improved understanding (Bazeley, 2007) and will be applied in this instance to understanding ways in which beginning teachers engage with EfS. Throughout the discussion, links will be made to the available literature and to the unit *Education for Sustainability for the K-6 Curriculum* (EDSE 412). Appendix 11.1 draws together summary details surrounding each case study.

At the time of case study visits, the new teachers had been practising between three and five school terms. It could be expected that in many ways they would have been experiencing challenges associated with adjusting to the profession (Furlong & Maynard, 1995; Hebert & Worthy, 2000; Flores & Day, 2005). However, all five beginning teachers demonstrated an ability to engage their children in positive learning activities over the school day. There were no observed instances of problematic student behaviour, and in general an air of calm pervaded the classes. None-the-less, given the mental, social and emotional demands upon them at this time, programming for and implementing EfS would have required considerable effort and determination especially as EfS is taught across the curriculum rather than being a separate KLA.

This chapter first draws upon evidence from the case studies to briefly answer the question: ‘*What did the beginning teachers do?*’ in terms of EfS. Following that, explanation is sought through examination of the circumstances surrounding beginning teacher action. In broad terms the cross case analysis revealed that the

culture of the school had to be taken into account but also of significance were the motivation and confidence of the individual, the manner in which each beginning teacher conceptualised EfS, and individual abilities regarding its implementation within the curriculum. Whilst observed patterns are considered below, discussion of the conclusions and implications for pre-service teacher education is reserved for the final chapter of this dissertation.

11.2 What the beginning teachers did

Throughout the analysis, the actions and commentary of the beginning teachers have been interpreted through the lens of Tilbury's (1995) definition of EfS. The following analysis of beginning teacher responses uses the same lens and is supported by a summary in Appendix 11.2. Appendix 11.2 shows some of those patterns of response that most inform the question about what the beginning teachers did.

All of the beginning teachers raised environmental matters in their teaching, either incidentally through their selection of children's literary texts and class discussions or through planned activities targeted as EfS. This is consistent with EfS as defined by Tilbury (1995). All but one beginning teacher described intentional effort to link children's lives closely to wider environmental concerns thereby establishing the relevance of environment-related understanding. Environment was definitely on their agenda.

The holistic curriculum base of EfS described by Tilbury (1995), and interpreted for this study as various modes of across curriculum teaching, was evident in the work of just two of the beginning teachers. The reasons for this are diverse, linked in a complex way to context of the school and the skills of the individual teacher.

Teaching environmental values, as a part of EfS (Tilbury, 1995), was important to all of the beginning teachers. They did this through their selection of content related to the natural world and through teaching outdoors in a way that could develop children's connection with nature. Additionally, four of the five beginning teachers were particularly conscientious in managing their classrooms in a way that demonstrated positive values towards conservation of materials and energy. They

were modelling good environmental practice. All supported any environmental initiatives already operating in their schools by encouraging children's participation.

Three of the beginning teachers incorporated environmental issues into their teaching programs, broaching 'matters of fact, values and morality' (Tilbury, 1995:202) in an age-appropriate manner with their students. Two others did raise environmental issues of relevance to their children, but the issues were explored in a transitory, less comprehensive manner.

Tilbury (1995) defined EfS as action-oriented in two ways: in the sense of encouraging learners personally and collectively to take action towards sustainability and also in the sense of promoting the use of active teaching and learning strategies. Whilst all of the beginning teachers engaged their students in active learning in relation to the environment in terms of using active teaching and learning strategies, just two of them strove to develop action competence in their students. EfS as defined by Tilbury (1995), is essentially socially critical, in that it includes a process of questioning norms of social behaviour in connection with the environment. There were elements of a critical approach in the work of the beginning teachers, but they were incorporated in a planned way by just three.

The study revealed diverse explanations for the actions of the beginning teachers. These are explored in the following sections beginning with an outline of elements of school culture that appeared to be of significance.

11.3 School culture, beginning teachers and EfS

From each case study it appeared that the values of the wider society, reflected in the culture of each school, were particularly relevant to an understanding of beginning teacher actions. This could be expected because circumstances within the school are already known to be influential on the way that teachers respond to their work. Values were reflected in the goals of most of the case schools and seemed aptly to fit with Stevenson's claim (2007:266) that the contemporary role of schools is reproduction of 'dominant curriculum and pedagogical practices'. If this is the case, schools could be challenged by the 'change' aspect of EfS which for some may include change in

pedagogical practice as well as a questioning of what is important in curriculum. Moreover a level of action on behalf of school students, that pushes change in the way things are done, can potentially be controversial because it challenges the values of the society. Where this is the case, the task of each teacher in pursuing EfS would be momentous.

Influences of national assessment on school curriculum

All of the schools were subject to pressures associated with national assessment of literacy and numeracy in grades three and five in the primary school (NAPLAN). Whilst this pressure assumed varying degrees of importance in the schools, it was perceived by school personnel, in all but one school, as a limiting factor on EfS. In four cases, it appeared that the outcomes of national testing were of paramount importance in the publicly stated goals of the school. In the fifth school, national assessment was important but the school's culture was enriched with a celebrated focus on environment. The implications of the national assessment program for the teachers' work are discussed below, but suffice to say here that the attention of teachers was turned towards NAPLAN performance in literacy and numeracy and away from the imperatives and pedagogies of EfS. None of the five beginning teachers was assigned to grades three or five, the NAPLAN testing years, but only one was assigned to a grade more than one year removed from NAPLAN testing. Preparation for NAPLAN in the year prior to testing was commonplace, meaning that all were subject to NAPLAN pressures, with one exception. This was the situation even though mainly the beginning teachers worked with very young children (Stage 1) and only one worked with Stages 2 and 3.

Principals' priorities

The literature surrounding school change is clear in accrediting a pivotal role to the school principal in igniting innovation and change (see for example Fullan, 1992). The five case study principals were all aware of the mandatory *Policy on Environmental Education for Schools* (NSW DET, 2001a) and all were able to discuss it in a way that demonstrated their understanding of the whole school and action orientation of EfS. However, four of the five expressed varying degrees of disinterest, with a single principal being enthusiastic for the change agenda of EfS. This placed

four of the five schools in Scott's (2007) first stage of development of a sustainable school, where school leaders are neither convinced of the importance, nor particularly supportive, but reasonably tolerant of EfS.

As an example, two principals were dismissive of any need for EfS, both being enamoured with programs for literacy and numeracy improvement in the school. The prioritisation of literacy and numeracy was primarily attributed to the demands of the employer, NSW DET, with one principal stating that it was against national test results that he would be judged as principal. It would seem that current procedures had convinced this principal that literacy and numeracy test results were the primary element of his personal accountability and that there was limited direction to him to institute whole school EfS in line with the *Policy on Environmental Education for Schools* (NSW DET, 2001a) as part of his principal role. Under these circumstances EfS is unlikely to be strongly integrated into classroom activities or to be part of a whole school program.

A further example of the influence of the principal over the degree of implementation of EfS was demonstrated in the case of Trudy. Whilst her motivation to teach EfS was strong, she felt constrained by the overriding 'other agenda' of her school. This was in direct contrast to the way she had felt at her internship school. At the latter school, the principal was enthusiastic about EfS and infused a sustainability culture throughout. This example further suggests that the culture of the school, and in turn the aspirations of the beginning teacher, can be strongly influenced by the principal and that the influence of the university over the work of the beginning teacher could be restricted in its impact on the capacity of beginning teachers to include EfS in their work. The university can encourage pre-service teachers and focus on the development of their EfS skills. However, if principals and those directly supervising early career teachers were convinced of the advantages of EfS and, in turn, there was strong leadership from education systems in favour of EfS, the impact of pre-service EfS would potentially be far greater.

Support for whole school EfS

Whole school approaches to sustainability (the significance of which to beginning teachers is explored below) build upon recognition of the need for change at a school, as distinct from just a classroom, level. Where school leadership was unable or unwilling to adopt a whole school approach to sustainability, it did not occur. Remarks from some principals, such as Will for example, suggest that the principals themselves need to feel more strongly supported by the education *system* if they in turn are to support whole school EfS. The implication is that if early career teachers are to succeed in their EfS endeavours, a cultural shift towards sustainability initiated at multiple levels and contexts within the system is necessary. Similarly, Ferreira, et al. (2009) have recognised, in the mainstreaming model of pre-service teacher education, the need for systemic change in tertiary education.

Prevalence of EfS expertise in the school

It is hardly surprising that case studies revealed that many of the teachers interviewed, *other than* the beginning teachers, held a limited conceptualisation of EfS. This is similar to the findings of Cutter-Mackenzie and Smith (2003), Chapman (2007), and Robottom (2007). With some notable exceptions, few teachers expressed awareness of the need for socio-cultural change towards sustainability, or how such an idea could impact on their day-to-day responsibilities as teachers. Whilst many expressed an ethic of care for environment and several described how in their teaching they helped students to explore links between their own lives and environment, organisation of student action for the environment was undertaken by few. With notable exceptions, the aspirations expressed in Tilbury's (1995) definition of critical, action-oriented and holistic EfS, were largely not a part of their world. This is a fundamental problem, because teachers are role models for, and indeed supervisors of, beginning teachers. This issue highlights the imperative for in-service teacher professional learning in EfS. Until the broader notion of 'Education for Sustainability' with its change agenda is a part of the consciousness of teachers, it will not be a part of teaching.

Furthermore, a review of the way in which people interviewed during the case studies (the beginning teachers' supervisors, principals and those identified as having an

interest in environment) interpreted EfS shows that, with some notable exceptions, teachers regarded anything to do with environment as a vehicle for teaching something else (literacy, numeracy or welfare). According to Gruenewald and Manteaw (2007), acceptance of this outlook only serves to undermine the imperative for EfS to be central to education, and to perpetuate the notion that schools should be geared to the needs of the growth economy (Stevenson, 1987; Gruenewald & Manteaw, 2007; Stevenson, 2007). Alternatively it could be construed that including EfS as a vehicle for teaching something else is a first step, in line with the NSW DET *Policy* (2001a), and a stepping stone to deeper involvement in the future.

Pressures to meet external standards in teaching practice

All of the beginning teachers were subject to internal organisational and supervisory factors common within NSW primary schools. In each of the schools, the new teachers faced restrictions regarding what they must teach, and to varying degrees, how they must teach. Such restrictions are common to all teachers, however these new teachers were closely supervised as they were compelled to complete documentation and practice at a satisfactory level for Accreditation at Professional Accomplishment with the NSW Institute of Teachers (NSW Institute of Teachers, 2006a). All of the supervising teachers were concerned to ensure the qualification of the beginning teachers with the Institute of Teachers. The Institute stipulates neither standards nor descriptors in relation to sustainability further adding to the marginalisation of EfS. In none of the cases did the supervising teacher have expectations of beginning teacher engagement in EfS but all had high expectations in ‘competing’ areas of endeavour, that is, particularly literacy, numeracy and behaviour management. These circumstances contributed to the challenges that the beginning teachers experienced in finding opportunities for EfS. It may be, given the described accountability constraints placed on beginning teachers and given that change is slow, that it would be expedient to assist beginning teachers to incorporate EfS into curriculum in a manner most likely to be acceptable to the school, a point argued by Grace and Sharp (2000).

Community expectations

In just two of the case schools were members of the wider community perceived as having an interest in environmental matters as a part of teaching/learning experiences.

Where this was the case, positive community involvement legitimised EfS in the school, and in one school community support harnessed by the beginning teacher proved to be vital to her EfS efforts.

Although the above patterns can be identified, each of the case schools presented a unique set of opportunities and challenges to any teacher who wished to incorporate EfS in his or her work. Walker (1995) maintained that, in general, the implementation of socially critical EfS in schools would be constrained due to the dominance of English and mathematics and the isolation experienced by many teachers working in EfS. From the comparison of case contexts it appears that in all but one school, these challenges originally identified by Walker (1995) applied.

11.4 Education for Sustainability: launching into the unknown

It is perhaps one of the more revealing findings of this study, that the pre-service teachers, in their final university year were largely unaware of EfS prior to EDSE 412. Three of the case study teachers offered the remark that they had not known about it previously, and were pleased to discover that it was a legitimate part of their teaching role. Implementing EfS is an entitlement and a responsibility of teachers in NSW schools. Had EDSE 412 not been a part of their pre-service teacher education, they, with the exception of one who subsequently experienced the operation of EfS during internship, would have embarked on their careers with little knowledge of it. This may be partly attributable to a lack of EfS in their own school education. The lack of environmental education in the school education and teacher education of many teachers has been reported (Tilbury, Coleman & Garlick, 2005) and this claim appears to be substantiated here. On the basis of the responses of the beginning teachers in this study (see the sections in each case study linking beginning teacher actions to pre-service teacher education, pages 130, 165, 204, 247, 281), it would seem that without EfS in pre-service teacher education, it is unlikely that they would have engaged with EfS as they did.

Furthermore, in particular aspects EfS constitutes innovative educational practice and as such might best be reinforced over a long period through many aspects of teacher education (Wideen, Mayer-Smith & Moon, 1998). This, plus the lack of earlier EfS

experiences amongst final year pre-service teachers, suggests that a successful mainstreaming model (Ferreira, et al., 2009) would have the advantage of contributing to EfS awareness from the beginning of teacher education, thereby allowing a much deeper construction of the notion of EfS on behalf of teacher students throughout their coursework and practicum experiences.

11.5 Motivation

This study revealed that there were beginning teachers who were determined to put sustainability on the agenda in their schools. It would appear that positive environmental values were held by all five of the beginning teachers in this study and, with the likely exception of Tony (page 265), that these values were established before they experienced EDSE 412. Interest in environment-related teaching amongst pre-service teachers has also been reported by Miles, Harrison and Cutter-Mackenzie (2006).

Whilst motivation to act on environmental values was not necessarily initiated during pre-service teacher education in EfS it appears to have been enhanced in a positive direction. In particular, these five beginning teachers identified that enhanced motivation to engage with EfS was linked to pre-service teacher education through: increased environmental awareness (content knowledge); the inquiry learning process; experiential learning beyond the classroom; elevated awareness of personal impact on the environment; increased confidence associated with strategies and processes; and from finding through pre-service teacher education that EfS could be, and should be a part of teaching. Increased motivation by pre-service teachers to engage with EfS was similarly reported by Whitehouse (2008) in association with methods she adopted from the philosophy of place-based environmental education.

As beginning teachers, all of the individuals in this study were encouraged when the children in their classes were interested in the authentic learning associated with EfS. For example, the children enjoyed outdoor learning, 'real' topics for discussion, English tasks and creative work with environmental themes and 'doing something good for the environment' [Tr:int:20.10.08]. Finding what children were interested in was particularly important to all of the beginning teachers who seemed to understand

the significance of working within children's areas of interest. This is consistent with the findings of Winther, Volk and Schrock (2002) that the enthusiastic and interested responses of children to environmental learning added to the motivation of beginning teachers to continue with it.

Three of the beginning teachers considered that their motivation to include EfS in their work had diminished over the period of their employment. Specifically, for Sue, motivation diminished because others around her did not care and she felt that her efforts were, to an extent, futile. For Andrew, even though a culture of sustainability prevailed in his school, motivation diminished as alternative professional interests took precedence. Diminished motivation for Tony was attributable in large part to his frustration from lacking skills in the implementation of EfS.

In contrast motivation increased for two of the beginning teachers. For Trudy this was because she realised the children in her class did not have much exposure to positive environmental values and experiences in their out-of-school lives and therefore needed EfS. For Annie motivation increased as she realised that in general children were not connected with the environment and did not share an ethic of care, and caring and connecting with environment were of primary importance to her.

The deepest personal interests of the individual beginning teachers appeared to shape their teaching decisions. The source of motivation to teach *per se* of each of the beginning teachers was different. For Annie, teacher identity appeared to centre on EfS and CAPA, and she demonstrated that she was able to skilfully blend these interests. Trudy's focus was on the development of children as learners and she claimed that her primary interest was to assist children from migrant backgrounds to learn the fundamental skills of English and mathematics, but she showed determination to do so along with planned EfS experiences integrated into curriculum. Andrew was primarily interested in CAPA, especially music. Tony and Sue held particular interest in the social sciences and Tony felt compelled to provide special opportunities for children experiencing social challenges in school society. No doubt further investigation would reveal that other beginning teachers similarly were primarily motivated to teach as a result of different interests. EfS took a relatively

central position in the work of Annie and Trudy. However for the three others, although they pursued EfS to some extent, the circumstances of the work situation and their other interests had a more profound impact on their teaching choices. The finding that teachers' personal interests shape their teaching preferences is consistent with research of teachers in general (Hargreaves, 1998).

This analysis suggests that if EfS is to be established and maintained as a priority in the teaching of beginning teachers, then initial teacher education must equip pre-service teachers with the skills to engage with EfS *within the individual's area of interest*. Individuals' teaching responses to EfS may have been greater and more enduring if, during pre-service teacher education, EfS had been explored through CAPA, or social sciences or through processes of teaching and learning and child development or any other area of interest. Such an endeavour could increase the numbers of teachers who conceptualise EfS as something that is relevant to the most interesting and important parts of their work and to their personal identities as teachers. In this way the special interests and abilities of each pre-service teacher would be of advantage in furthering EfS.

In summary, positive motivation to engage with EfS was linked to individuals' values as well as particular experiences in pre-service teacher education in EfS. When the graduates became teachers, aspects of their working context affected their motivation to engage with EfS. These aspects included the responses of children in their classes, their growing awareness of the nature of their students and the culture of the school. For some motivation increased and the analysis suggested that Annie and Trudy incorporated EfS as a part of their identity as teachers and continued to pursue it in determined and skilled ways. However this was not the case for all of the beginning teachers, three of whom experienced diminished motivation, sometimes because other aspects of teaching were of greater personal interest to them. However it was evident that motivation can be diminished by competing priorities and values of the schools, lack of leadership in EfS and other constraints that can be overwhelming such that beginning teachers can become compliant to the existing expectations of the workplaces, to the detriment of EfS.

11.6 Confidence

It has been reported that positive teaching experiences in EfS are likely to boost confidence (Summers, Corney & Childs, 2003). This was the case for Annie and Trudy whose confidence was greatly increased as a result of having taught an EfS segment to children visiting the university during EDSE 412 referred to in Chapter 4 (page 87). This was significant, as success in performance can in turn be expected to increase willingness to try again (Bandura, 1997). The successful teaching experience provided these two pre-service teachers with the opportunity to plan a teaching sequence in EfS, to connect the planned outdoor work to the curriculum and to anticipate children's response to the work. Of even greater significance was the opportunity to then gauge the children's response.

Bandura (1997) suggested that confidence could be augmented through positive vicarious experience as well as successful actual experience. This was the case for Tony and Trudy who ascribed a high level of confidence in undertaking outdoor environment-related projects to their association with other teachers in the internship schools. It would appear that confidence could be enhanced through practicum/internship experiences where practical EfS projects were being demonstrated in the school. The difficulty of organising suitable practicum experiences is acknowledged (Beckford, 2008) but the case studies clearly indicate that it is most desirable.

All of the beginning teachers identified EDSE 412 as having raised their awareness of the environment and of ways they could find more information. Some claimed that their confidence increased as a result of knowing more about the environment. Knowing more is significant because it influences what and how teachers teach, the level of classroom discourse and the selection of class resources (Grossman, 1990). Trudy, Annie and Sue, who demonstrated most determination to implement EfS, actively sought the information they needed. Developing content knowledge in relation to environment was shown to have had an important role in the pre-service teacher education of these five and was linked with confidence to proceed with EfS.

Two individuals admitted to having weak backgrounds in science. Both felt that their lack of science knowledge limited their abilities in EfS, implying not only that science knowledge was important to their progress, but also that they perceived science knowledge to be an integral part of EfS. Many authors (Summers, et al., 2000; Khalid, 2001; Cutter-Mackenzie & Smith, 2003; Flogaitis, 2003; Summers, Corney & Childs, 2004, 2005; Zemits, 2006; Parlo & Butler, 2007; Zak & Munson, 2008; Skamp, 2009) have argued, on the basis of studies with teachers, that teacher content knowledge, in particular aspects of environment and often science content was inadequate. Arguably, knowledge of economic and political concepts as they impinge on environment-related decision-making is of equal importance. The present study endorses the notion that content knowledge in relation to environment should be developed during initial teacher education. Case participants acknowledged that they had learnt a great deal in pre-service teacher education in EfS about matters of which they were previously unaware and which stimulated their interest in environment.

In particular, several noted that having to find information from *primary* sources in the inquiry learning project during pre-service teacher education in EfS had given them skills, and confidence to draw on their own skills, as well as the expertise of others. Once again the efficacious nature of the constructivist approach had incidentally been demonstrated. Whilst there appeared to be good reason to include relevant content knowledge in pre-service teacher education, of even greater importance was the outcome that these beginning teachers were willing and able to find the information they needed for themselves and capable of drawing upon the expertise of local organisations and individuals as did all of these beginning teachers to a varying extent. This point is argued by Ballantyne (1995) who maintained that the *process* of environmental learning per se, should be the focus of teacher environmental education as distinct from content knowledge, and the process of inquiring into the facts of an issue is just one process of environmental learning.

Knowledge of the specific strategies thought to be efficacious in the delivery of a particular curriculum (pedagogical content knowledge) is also considered to be essential in pre-service teacher education (Grossman, 1990). Indeed Lindemann-Matthies et al (2009) reported that where practical teaching skills in biodiversity were

prioritised in primary pre-service education, pre-service teachers not only felt confident to teach, they also felt that it was their own responsibility to learn subject matter independently and some of the teachers in the present study did this. However, Tilbury, Coleman and Garlick (2005) identified that the pedagogical components of EfS were almost always absent from initial teacher education. Indeed it could be surmised, that if teachers are not aware of the minutiae of student active, investigative, intellectually demanding strategies to which EfS is amenable and how such strategies can be applied across the curriculum at particular stages, then they will not necessarily seek them out. Others have made the point that *effective* teacher professional learning is tailored to the immediate needs, meaning the pedagogical needs, of teachers (Grossman, 1990; Parlo & Butler, 2007; Skamp, 2009). Of course this is not to say that the role of teacher education is to provide teaching strategies for every occasion. It is to imply that one important component of teacher education is the promulgation and evaluation of contextually relevant, student active teaching and learning strategies which are linked to the concepts inherent in EfS *and* to the primary curriculum. Beginning teachers in this study reported that, actual experience of games (as distinct from knowledge *about* games), and other strategies (such as electricity audits and biodiversity surveys) that they could later use were valuable and added to their confidence to use such strategies.

For the beginning teachers in this study experiences in the 'real world' added to their own understanding of sustainability and expanded their notion of what they could offer as teachers. However, it is of particular significance that they nominated practical and outdoor experiences in pre-service teacher education in EfS as contributing to their confidence as teachers to work outside the classroom. Outdoor education has often been advocated as an essential element of EfS (Gruenewald, 2003; Ballantyne & Packer, 2009) and it has been acknowledged that the special circumstances surrounding outdoor teaching may need to be addressed in teacher education (Simmons, 1998; Skamp & Bergmann, 2001; Moseley, Reinke & Bookout, 2003). Specifically, all five teachers in this study reported that they derived confidence from the opportunity to connect practical and outdoor experiences with the curriculum *through their own efforts* and this is consistent with the tenets of constructivist learning.

Other elements of pre-service teacher education in EfS that the beginning teachers believed contributed to confidence included exposure to resources they could later use and this is consistent with a report by Lang (1999/2000). Gaining familiarity with the NSW DET *Policy* (2001a) was also mentioned as adding to confidence. Although no study was found that reported the importance of mandatory policy in this respect, others have argued how the lack of a mandatory policy has inhibited implementation of environmental education (Lindemann-Matthies, et al., 2009).

The above elements of pre-service teacher education in EfS were advanced by the beginning teachers as having added to a sense of confidence. When discussing feelings of confidence, they remarked that they would have liked more exposure to particular experiences during pre-service teacher education, especially experience in linking the primary curriculum to EfS, more examples of teaching strategies and greater opportunity to gain familiarity with suitable resources.

One further element of pedagogical content knowledge identified by Grossman (1990) as being essential in teacher education is knowledge of students' levels of understanding of concepts within different content areas. Where two of the five participants, as pre-service teachers, had availed themselves of the opportunity to engage visiting local children in environmental learning in EDSE 412, the experience added not only to confidence. This experience also suggested that knowledge of students' level of understanding was best acquired through personal interaction with the students. On reflection, gaining a knowledge of students' level of understanding in EfS was not a well developed component of EDSE 412 and should be strengthened, especially through the opportunity to interact with students using strategies specifically promoted in EfS (from, for example, NSW DET, 2001b; ADEH, 2005; NSW DECC & NSW DET, 2006). Research into student understanding of environmental concepts is currently limited to studies of particular concepts in particular populations (see for example: Boyes & Stanisstreet, 1993; Kruger & Summers, 2000; Shepardson et al., 2009). More research is required in this area and could perhaps be most efficaciously achieved if the study of students' conceptual understanding was specifically connected with curriculum frameworks that actually

attempt to incorporate sequential and age appropriate concept development in EfS. Work on such a framework has begun in Australia (AGDEWHA, 2010), but as a necessary next step the framework must be linked to the emerging national curriculum (ACARA, 2009) and grounded in the practical documentation that teachers use for class programming.

Teaching experience, content knowledge, gaining knowledge of a variety of teaching strategies and experience with the strategies appear to have augmented these individuals' perceptions of confidence in their abilities to practice EfS. Their pre-service years in general had provided them with some opportunity in all of these areas. However, Tschannen-Moran and Hoy (2001) reported that confidence, once developed, is connected to specific tasks, subjects and contexts of teaching rather than applying to teaching in general. Because elements of confidence are task and context specific an otherwise confident teacher may feel less able to accomplish goals in particular areas. This appeared to be the case for Tony, who felt very confident with outdoor project work but who, as previously described, expressed a lack of confidence, indeed frustration, in relation to integrating EfS into his teaching program, particularly English. In fact at the time of completion of pre-service teacher education in EfS, Tony was doubtful of his ability to integrate EfS into his teaching program. At the start of his career, he was working in a school where it was common practice for the whole school to celebrate environmental events in a situation where, it appeared, EfS was tacitly regarded as an 'add on', not a part of the core curriculum of the school. Under these circumstances Tony was unlikely to receive assistance in integrated programming of EfS. This example further demonstrated the crucial role of skill development in curriculum integration of EfS in the pre-service years, so that new teachers have the confidence to practise integration, even though others in the school may see no need for it.

In a related example, Trudy was perceptive in noting that her confidence was affected by the 'setting':

On my internship last year I felt very confident including it [EfS] because I knew that over the entire school it was a priority ... so I felt quite comfortable teaching it and including it because I knew that it would be well received [Tr:int:21.10.08].

The 'setting' in which four of the teachers were working was *not* particularly conducive to EfS and, just as Tschannen Moran (2001) reported, the setting compromised the conviction with which three of these four approached EfS, even though they reported being confident on completion of pre-service teacher education in EfS. However Annie, working in a school where EfS was not highly regarded, appeared undaunted by the culture of the school and her reaction seemed to be connected with her confidence as well as strong personal determination to include EfS.

Education for Sustainability represents a special case in schools because it is not an established discipline with an organised curriculum. The findings from this study are aligned with the review by Tilbury, Coleman and Garlick (2005) that indicated that EfS is poorly represented in the curriculum of many schools, including those in which teachers will begin their careers. For this reason it may be that a further dimension of knowledge required by pre-service teachers is knowledge of the politics of the curriculum, and, as acknowledged by Grossman (1990), the culture of schools.

Of course pre-service teachers are learning first-hand about the culture of schools through their practicum and internship experiences. As previously mentioned in the discussion about whole school EfS, it would seem that the beginning teachers in this study entered the profession with expectations of engaging with EfS in a manner not prevalent in schools and therefore they were not prepared for the challenges before them. There is an implication that beginning teachers need opportunities to think in advance about what EfS means to them, how important they believe it to be in their practice, and the implications of these for their teaching decisions in future schools depending on the culture of those schools. The point being made here is that pre-service teachers should have opportunity to take into account realistic parameters of school context when planning in advance the kinds of teaching strategies that they may wish to use in schools. They would then have greater awareness of the challenges ahead and perhaps greater confidence in their abilities to meet those challenges.

This study demonstrated ways in which pre-service teacher education can contribute to beginning teacher confidence regarding EfS. In particular, opportunities to

experience teaching in EfS, gains in content knowledge, experience and knowledge of strategies that can be used, all played an important role in building confidence. The study also indicated that such opportunities in pre-service EfS were crucial since EfS remained low on the priority of both professional learning and practice in four of the five schools.

11.7 Conceptualising EfS as change

One, albeit imprecise, indicator of how the beginning teacher conceptualised EfS was the way in which that person adopted EfS in his or her teaching. The following is a discussion of what the beginning teachers did and how this reflects their conceptualisation of EfS.

The essential challenge of EfS is its change agenda:

Education for Sustainability goes beyond providing information about the environment. It is seen as a process which motivates and engages people in creating sustainable futures. It is not only a process which builds competence but also a change strategy which will assist people and organisations to move towards sustainability (ARIES, 2009:4).

One component of ‘assist[ing] people ... to move towards sustainability’ (ARIES, 2009:4) is the process of engaging students in actions that represent a more sustainable way of life. Such actions help children to understand what ‘sustainable’ could mean, and they also demonstrate that the teacher or school value decision-making and actions that take environmental impacts into account. Annie and Trudy, employed in schools where few environmental activities were evident, worked beyond school expectations in this regard. As part of curriculum, they engaged their young students in activities that demonstrated ways of living more sustainable than the norm practised in their schools. In this sense they were engaging in the ‘action’ that Walker (1995) argued would be difficult in schools. ‘Action’ is difficult for a host of practical reasons, such as organising events, keeping plants routinely watered and weeded and so on, when there are so many demands competing for the time and energy of both teachers and of children.

However, there are more fundamental interpretations of ‘action’ in EfS, and they require deeper thought and greater courage to pursue. Building competence in students to create a more sustainable future means providing them with the opportunity to imagine a sustainable future and then giving them the opportunity to act on that vision. The extent to which this can be done could be limited with children at an early developmental stage. However Annie, in particular, appeared to understand that process. Her young students explored their local place in a curriculum relevant way, expressed their visions of the future for this place through the visual arts, publicly displayed their ‘imagined future’, requested a garden and orchard for the school and physically worked towards both. ‘Action’ in this sense is challenging in schools because of the physical and organisational difficulties, but also because it represents a conceptualisation of teaching that may be different from what is expected within the institution. More fundamentally, if curriculum is the knowledge of most worth from the culture, then EfS work at the present time can be understood as standing outside the commonly held conceptualisation of curriculum. Working at the Year 2 level, Annie was scaffolding a process aimed at developing action competence as described by Jensen (2002). This excellent example (page 237) showed one beginning teacher’s conceptualisation of EfS as a process that goes beyond the handed down curriculum and leading toward cultural change.

Annie along with Trudy was most assiduously engaged in building the action competence skills of students. Both were determined to plan, to undertake the processes of gaining permission, and to gain the support of others in order to pursue their goals. As could be anticipated, given the remarks of Stevenson (2007), both countenanced opposition from the school executive. Their principals were pre-occupied with NAPLAN testing, largely dismissive of EfS and not enthused about diversions. There were no School Environment Management Plans in these schools. The responses of their principals could be expected to impact negatively on beginning teacher aspirations for change (Littledyke, 1997) but these two were none-the-less determined to engage with EfS. Both strategically gathered supporters for their initiatives, either from within or outside the school. In doing so they carried out learning activities related to EfS, over and above the requirements of their schools and the NSW Institute of Teachers, but entirely consistent with relevant curriculum

documents and in line with the NSW DET *Policy on Environmental Education for Schools* (2001a).

It is likely that their actions were linked to pre-service teacher education that had offered them opportunity to conceptualise EfS as action and as a change process. In support of this ideal, others have argued that in pre-service teacher education it is necessary to encourage a broad long term view of environmental education rather than one which is more expedient in terms of offering only that which is readily accepted in schools in the immediate term (for example Firth & Winter, 2007). In adopting EfS as a change process, neither of the beginning teachers had an expectation that their plans would be readily accepted, and both approached their principals with some trepidation. However, they held a personal vision for EfS different from the views of influential others in their schools, and each had the courage to pursue that vision.

While Trudy and Annie viewed EfS as a change process, Sue conceptualised it as an essential part of curriculum for the purposes of shaping a more sustainable future, but without pursuing deliberate actions that could challenge assumptions upon which the priorities of the school were built. Tony and Andrew were not strong in conceptualising EfS as an integral part of their everyday teaching role. As a result, EfS in their work was expressed incidentally through discussion, routines of classroom management and seemingly ‘disconnected’ activities commonly conceived as EE, and without a purposeful sustainability agenda.

It would be unrealistic to expect all beginning teachers to adopt the change strategies they had encountered in EDSE 412. However it would appear that it is necessary to provide explicit opportunities for pre-service teachers to develop a practical and coherent conceptualisation of EfS that they can carry forward into their teaching. Jones and Maxwell (2008) argued for greater attention to the use of scaffolded reflection in teacher education and this would be one entry point for EfS development. Individuals are entitled to hold their own views of the future and the purposes of their daily work. However careful effort, indeed scaffolded effort, to encourage pre-service teachers to draw together the threads of their understanding of EfS could be vital. It could lead to their deeper realisation of the potential connectivity of sustainability to

everyday teaching decisions. The two beginning teachers most active in EfS understood the holistic curriculum base of EfS, the scope of a whole-school approach and some of the strategic planning that would be needed to bring about cultural change, the need to help children to feel their connection with the environment and the importance of action in EfS. It seems that teacher education in EfS should aspire to assist pre-service teachers to construct this complex kind of understanding, if they are to implement EfS in the manner defined by Tilbury (1995) and that proposed in relevant Australian documentation (NSW DET, 2001a; ADEH, 2005; AGDEWHA, 2009).

11.8 Conceptualising EfS as whole school

A whole school approach to EfS is promoted through the *National Environmental Education Statement for Australian Schools* (ADEH, 2005), the NSW DET *Policy* (2001a), the Australian Sustainable Schools Initiative (AGDEWHA, 2007) and Sustainable Schools NSW (NSW DECC & NSW DET, 2006) and advocated in the literature of environmental education (Scott, 2007). Reports of whole school approaches to EfS (Henderson & Tilbury, 2004) show that there have been some successes internationally and Sustainable Schools NSW (NSW DECC & NSW DET, 2006) provides illustration of some successful instances of Australian whole school EfS. However, whole school approaches to EfS, whilst being strongly advocated, do not appear to be commonplace. Just one reason for this could be that pre-service teacher education is deficient in that it does not provide opportunities for intending teachers to gain understanding of whole school approaches (Tilbury, Coleman & Garlick 2005). However the processes of 'whole school' were a part of EDSE 412 and all five of the case study teachers held an understanding of whole school EfS. A remark from Trudy for example, made at the end of the pre-service unit, shows that the idea had been novel to her: 'I never considered a whole school approach as in changing the culture ... I never really considered that. I didn't think you could change a *school*. You have to change so many minds' [Tr:int:T2].

Additionally, all were ready to act upon this understanding, with three joining teacher environment teams in their schools. In a school where there was no teacher environment team, Tony took initial steps towards whole school engagement by

organising Earth Hour for his school. In a further school, with no teacher environment team, Sue encouraged her students to be active in the school's voluntary gardening activity and actively supported a (somewhat declining) recycling initiative. In his school, where a culture of strong support for EfS prevailed, Andrew did not initiate whole school activity in EfS, but recognised the aspirations and the advantages of the whole school approach, saying: 'I think if it was just one teacher trying to do it with just their class it wouldn't have much effect at all and it would probably be lost the next year when the kids move on, so the whole school approach is good' [An:int:6.8.08]. This beginning teacher competently played his part in supporting EfS in his school. Pre-service teacher education in EfS was important in this circumstance because it contributed to beginning teacher acceptance of, and confidence in, adapting to the whole school EfS culture.

The immediate culture operating in the school has been reported by others as influential on the emotional response of beginning teachers to their work (Hargreaves, 1998; Flores & Day, 2005; Panizzon, Barnes & Pegg, 2007) and the present study demonstrates how important a whole school approach to EfS can be in supporting the enthusiasm of new teachers. Sue, who held a strong concern for the future, understood the necessity of children learning to make decisions to meet the challenges of the future, and the need for EfS to be a whole school endeavour. She recognised that in her school EfS was 'not a whole school thing' [Su:int:27.8.08]. In what she perceived as a culture of disinterest in the school, she 'started to lose the drive a bit here' [Su:int:26.8.08]. This example underscores the importance of the establishment of a culture of sustainability across the school. Without it, this beginning teacher, capable, skilled, interested and with a broad conceptualisation of the change agenda of EfS, felt that her efforts were in many ways futile.

Whole school approaches to EfS, or even school contexts that are generally supportive of EfS, are clearly important if beginning teachers are to actively pursue EfS in their work. It was significant that the pre-service teachers understood and identified the advantages of whole school approaches to EfS. However, in four out of five cases the mismatch between the conceptualisation of EfS as whole school and the reality of the case schools added to a sense of frustration for the beginning teachers. It may be that

although images and processes of whole school operation of EfS had been incorporated in pre-service teacher education, insufficient opportunity was provided for pre-service teachers to reflect on how EfS could be included in their work, given the variety of school contexts, such as those presented here by these beginning teachers. This echoes the view of Ballantyne (1995:124) that teachers should work together ‘in identifying and addressing influences which might constrain the transformative practices of environmental education’. The purpose of this would be to ground the aspirations of EfS into the reality of school contexts, which at the present time are so variable in terms of a sustainability culture. The framework offered by Scott (2007:66) and titled a ‘model of institutional development’ could be useful, as could the ‘steps in becoming an environmentally active school’ in the NSW DET *Policy* (2001a:20), as a starting point for analysis of school EfS context by pre-service teachers.

11.9 Beginning teacher conceptualisations of EfS that are outside Tilbury’s (1995) definition of EfS.

Operating in each of the case study schools were systems put in place to reward children for positive behaviours, including positive behaviours toward the environment. Trudy purposefully introduced a reward system for class recycling. She explicitly discussed the reward system as having value, not only because the children enjoyed engaging with it, but also because she considered that it was an appropriate way of establishing more sustainable routines. Trudy intended that these routines should become a way of life for each child and a part of the culture of the school. She also believed that, whilst the children were very young and had limited understandings, a reward system was an appropriate first step. This beginning teacher ensured that she supported the reward system with teaching that elaborated reasons for the recycling behavior she wished the children to adopt.

Tilbury (1995:202) maintained that ‘above all, the evolution of an environmental ethic is educational ... this educational process requires that decisions are arrived at through discussion and consideration of the different value systems involved’. The conceptualisation of EfS offered to pre-service teachers in this study had its foundations in Tilbury’s (1995:202) definition, here understood to be compatible with

Vare and Scott's (2007) ESD 2. The reward systems that were used in all of the case study schools for the purposes of shaping students' environment-related behaviour fell within the behaviourist tradition (Kollmuss & Agyeman, 2002) and were consistent with Vare and Scott's (2007) definition of ESD 1. Vare and Scott (2007) claimed that ESD 1, which in their view may include incentives and penalties for particular behaviours such as for reducing waste or energy, is necessary to achieve immediate changes in the way people do things so that greater sustainability is achieved for the common good. It could be surmised that when the beginning teachers added to their repertoire of practice the ESD 1 practices commonplace in their schools, they were unaware of the philosophical inconsistencies, and that these were practices that a purely socially critical theorist such as Breiting (2009) would reject. It is also possible of course, that the reward systems could well be an example of a phenomenon Jones (2009:6) described as 'a degree of automated thinking and behaviour ... essential to dealing with the immediate routines and multi-tasking roles of teachers ... generally built upon the values and past experiences of what works and is expedient'. However, adoption of ESD 1 processes by Trudy and Annie who were most determined to institute a sustainability culture in their classrooms through processes of ESD 2 was more intentional than automated, but none-the-less expedient, in terms of gaining their immediate goals of establishing everyday pro-environmental routines, or 'sustainable social norms' (Wals, 2010:150). Stevenson (2007) argued that because there is a gap between theory and practice in environmental education, there is a need for theory and policy to be informed by practice. Perhaps these examples from the case studies encourage a conversation about the 'appropriateness' of a reconceptualisation of EfS that would allow space for the adoption of Vare and Scott's (2007) inclusive position, in particular to take account of the early developmental stages of children such as those being taught by the beginning teachers in this study. To do so is to question one of the orthodoxies of environmental education (Ferreira, 2009), specifically the 'orthodox' status held by essentially socially critical environmental education in this and other countries at the present time. It is recognition that ESD 1 practices are deemed by teachers to be a worthwhile part of everyday practices in the primary school and this is one aspect of a gap between theory and practice as identified by Stevenson (2007).

11.10 Curriculum integration

Two of the beginning teachers intentionally integrated EfS into the curriculum in ways consistent with the NSW DET *Policy* (2001a) and with the holistic nature of EfS itself (Tilbury, 1995; Gayford, 2000) and one other beginning teacher desired to do so. One of these three beginning teachers, for example, described EfS as an ‘umbrella’ that could be ‘woven through the whole curriculum’ [Tr:int:T2]. For another, it was ‘not like an extra subject. You can just incorporate it into what you’re doing’ [An:int:5.4.09]. When planning for EfS, Trudy, Annie and Sue drew heavily upon the strategies and ideas that they had encountered in their pre-service teacher education in EfS. They admitted to having relied on their written notes, and in particular, the lesson plans that they had developed during their pre-service teacher education. In so doing, they were demonstrating how the constructivist approach adopted at the university produced the most valued learning and was subsequently useful. In particular there were many instances where pre-service teachers were required to think through examples of the process of curriculum integration for themselves.

No study could be found that expressly linked pre-service practice of skills of integration of EfS into primary curriculum and the ability of beginning teachers to use this skill. However, this study demonstrated that the three beginning teachers most active in EfS understood it as integrated curriculum and attributed this understanding to their work in pre-service teacher education in EfS. Specifically, it demonstrated that the significant contribution of pre-service teacher education in EfS was that it provided them with the tools that *enabled* them to engage with EfS in the classroom into which they were placed. Annie explicitly stated that she viewed pre-service teacher education in EfS as valuable because it provided her with the strategies she needed to pursue her EfS goals. For Annie curriculum integration was so fundamental to EfS, that she, as did others, recommended a strengthening of programming skill development in pre-service teacher education in EfS.

In contrast, not all of the beginning teachers shared the accomplishment of curriculum integration of EfS. The value of the beginning teachers’ recommendation to strengthen programming for EfS in pre-service education is amplified through comparison. As an example, Tony perceived that he had overlooked several

opportunities to use children's rich environment-related experiences (such as an EEC visit) to develop children's relevant conceptual understandings. To his credit, Tony identified his lack of programming skills as a frustration and a limitation on his capacity to engage with EfS. Grossman (1990) made the point that initial teacher education should incorporate knowledge of the curriculum and it clearly applies here.

Sue, who had worked hard to integrate EfS into the curriculum was drawn to Jensen's (2002) model when it was shown to her as a new teacher. However, she admitted that she and others simply did not understand it when it was used to assist pre-service teachers in planning for EfS during EDSE 412. On the other hand, Annie and Trudy who demonstrated greatest ease in curriculum planning claimed to have held Jensen's (2002) model in mind. This theoretical model proved useful for some, was inaccessible to others at the pre-service stage, but in at least one case appeared to be more comprehensible after experience with programming and interacting with her own class.

The case studies also provide two examples in which the beginning teachers were prevented from integrating environmental work into their teaching in a holistic manner. In NSW primary education, EfS finds a 'best fit' with the outcome statements of the science and social science syllabuses. Removing responsibility for teaching those KLAs made it challenging for Andrew and Sue to adopt holistic EfS teaching. Sue, in a circumstance where she was initially required to teach only mathematics, experienced a reduced capacity to explore the broad implications of the environmental data the children were manipulating.

In a related manner, timetabling of a silo curriculum, common in secondary schools and illustrated by Sue's case, provided similar challenges to the implementation of holistic EfS (Summers, Corney & Childs, 2005; Ladwig, Mockler & Ross, 2010). Under these circumstances an holistic approach to EfS requires collaboration between all teachers delivering the curriculum to a given group of students. In some Australian secondary schools this has been achieved through the adoption of rich assessment task practices that require students to pursue an environmental investigation, using the skills and time allocation from several faculties (Queensland State Education, 2004).

For the beginning teacher in the example above allocated to teaching Environmental Maths in a primary school, with a staff culture wherein environmental matters were not discussed and where NAPLAN testing was of overriding concern, it would appear that such collaboration was unlikely to occur.

This discussion about how two beginning teachers experienced difficulty implementing EfS in an holistic manner, in circumstances where their control over the curriculum delivered to their students was truncated, bears relevance to the contemporary trend towards a 'silo' curriculum in primary schools. The trend towards pronounced delineation of subject boundaries (Smith & Cupitt, 2007) often accompanied by use of commercial teaching products designed specifically for delivery of all the subject, for example mathematics, required at a particular grade level or all the reading material required (as described in some of these case studies), further marginalises the classroom teacher's capacity to implement holistic, locally relevant and issues-based EfS. This problem is exacerbated where the teacher is a part of a stage team where there is a requirement for consistency of programming (exclusive of EfS) across classes.

Stevenson (2007:265) argued that research effort in environmental education should be focused on 'building the ... technical capacity' of educators to shape practice rather than on political international discourse. Building technical capacity of teachers is precisely the purpose of this study, and practice to develop skill in curriculum integration in relation to EfS has been identified by the beginning teachers as of singular importance. Furthermore, there is potential for a collaboration of purposes in NSW between the Quality Teaching professional learning program (NSW DET, 2003) and EfS. In this potential alliance lies the possibility for alignment of the purposes of both EfS and state-wide efforts in professional learning in terms of utilising curriculum integrated tasks that can be united with authentic environmental issues.

Whilst the preparation of lesson plans and integrated units of work for an *imagined* class and analysis of existing units of work are commonplace in primary teacher education, the actual implementation and subsequent appraisal of such plans was even more highly valued by teachers in this study. In two of the cases examined, Trudy and

Annie had the opportunity, as part of their inquiry learning assessment work, to teach children from a class visiting the university whereas three had not. Here Trudy and Annie trialled, then appraised, their prepared EfS integrated lessons. Both valued the experience, with one claiming it was the ‘biggest impact’ of pre-service teacher education in EfS and ‘proved to me that I was able to teach it’ [An:int:5.4.09]. For a teacher, curriculum planning and the associated pedagogy are complex tasks which bring together knowledge of those being taught, knowledge of the desired outcomes of teaching, and knowledge of the strategies that can be used (Grossman, 1990). The beginning teachers believed that experience with curriculum planning in the context of EfS was essential if they were to go on and use it. Causality is not being implied, but it was those two individuals, who, as pre-service teachers took advantage of the opportunity to adapt EfS into a real, albeit short pre-service teaching experience, were later most adept at curriculum integration.

11.11 Benefits, opportunities and challenges for EfS in pre-service teacher education

Well over a decade ago Walker (1995), Stevenson (1987) and others identified challenges associated with socially critical environmental education and many of those challenges remain (Stevenson 2007). However over the intervening years there appears to have been an increase in public interest and awareness in issues of environment. At the same time, new resources have become available to schools in the area of EfS and new programs of professional learning have been made available. In 2010, the Year of Learning for Sustainability in all NSW DET schools, it would seem that these events, that is, shifting public awareness and improving resources for schools, could have brought about a change in the landscape of EfS. However whilst some schools have embraced the opportunities that a new climate of social and political interest in EfS has brought about, others remain resilient to change and maintain a culture of reproduction in the purposes of education, to the detriment of a more sustainable future.

From the cross case analysis it is possible to identify benefits from pre-service teacher education in EfS in terms of placing EfS on the agenda in some case study schools. This study has established important links between beginning teacher adoption of EfS

practices and the particular mode of pre-service teacher education implemented. Most importantly, EDSE 412 gave them the warrant to teach EfS. In particular the beginning teachers claimed that the described pre-service teacher unit gave them strategies that they could apply, knowledge of environment that they could use, knowledge of resources including other people that they could draw upon, greater awareness of the importance of EfS, the ability to assist with existing environmental initiatives in the schools, capacity to undertake outdoor activities and in association with all of the above, confidence in their own abilities to pursue EfS. These advantages did not accrue similarly to all five of the beginning teachers and their individual skills and the contexts within which they worked compromised their various ambitions in particular ways. These outcomes however do show that pre-service teacher education in EfS can have a positive impact on whether or not at least some beginning teachers proceed with it, at the start of their careers.

From the cross case analysis there were observed specific opportunities arising from pre-service teacher education in EfS. These included the opportunity to provide a sequence of learning experiences that assisted pre-service teachers to construct their own conception of EfS and of why it is an important and worthwhile component of teachers' work; to share with pre-service teachers a vision for the future rather than more of the same; to share with pre-service teachers the many resources that are available to teachers in the field of EfS; and to assist them to explore how these resources could be a useful adjunct to quality teaching and learning.

From the cross case analysis it seemed that there are specific challenges for pre-service teacher education in EfS. They included the provision of opportunities for pre-service teachers to think about what they really want to achieve in EfS themselves and what they think might be the best ways to go about it. Further challenges are the illustration of how as beginning teachers they can find their allies and continue with EfS even if they feel isolated regarding their EfS ambitions in their schools; provision of ample opportunity to explore curriculum integration so they can satisfy competing priorities of a school unreceptive towards EfS; and through all of the above building their competence in EfS.

This chapter has provided a comparison of five case studies, a discussion of how the findings link with pre-service teacher education and how they match the existing literature. In the following chapter, conclusions are drawn from this and the results presented in Chapter 5, followed by implications and recommendations from the study.

Chapter 12: Conclusions, Recommendations and Implications

12.1 Introduction

The ultimate purpose of asking the question: ‘*How can pre-service teacher education better prepare beginning teachers in Education for Sustainability?*’ is to elevate EfS to a position where it is a part of the everyday practice of teachers and managers in schools. It has been argued that, to achieve this purpose, pre-service teacher education is the priority of priorities (Tilbury, 1992). Whilst this study supports the assumption inherent in this imperative, that is, that pre-service education in EfS can make a substantial contribution, it also reports many constraints on beginning teacher implementation of EfS. Furthermore, there are few studies in the literature reporting on *how* pre-service teacher education in EfS has been efficaciously shaped. This gap is addressed in the present study. The chapter begins with some specific conclusions that can be drawn in relation to this example of pre-service teacher education and EfS.

12.2 Conclusions from Phase One

The first question inquired into the views of those still in their final year of pre-service teacher education. As a result of survey information gathered at the commencement and end of a semester unit in EfS, as well as of interviews conducted at the end of semester, a series of conclusions can be drawn in answer to the question:

How does a teaching unit in EfS impact on pre-service teachers?

These findings are also supported by the five case studies.

In the study sample of one cohort in one institution, pre-service teachers were concerned about the environment and remained concerned throughout pre-service teacher education in EfS. However, they believed they could help the environment and that teachers have an important role to play in solving environmental problems through teaching. Pre-service teacher education built upon pre-service teachers’

existing high levels of motivation to include EfS in teaching and this has also been reported elsewhere (Whitehouse, 2008). At the completion of their unit in EfS, pre-service teachers attributed their motivation to factors such as increased awareness of issues, concern for the future and realisation that environment is relevant to their own lives and the lives of their students. Also there were those who held the view that this was an important component of education and that school students have the right to know about it.

Furthermore, it can be concluded that in this study pre-service teacher education augmented confidence towards adopting EfS in teaching from an initial quite low level. This improvement in confidence was attributed to improved content knowledge, improved pedagogical content knowledge, and improved knowledge of resources to use. A continued lack of confidence amongst some was related to having not had teaching experience in EfS and to concerns about how acceptable EfS would be in schools.

12.3 Conclusions from Phase Two

Case studies of five teachers, who volunteered for this study and who had been working in their schools for a minimum period of almost three school terms, formed the basis for conclusions in response to the question:

In what ways do beginning teachers engage with EfS and why?

Some of this study's findings about the context of schools and the widespread inexperience of teachers with EfS have been reported elsewhere. However none of the conclusions drawn from this study, and linking EfS to beginning teacher experience, appear to have been reported in the literature, although some find common ground with the literature pertaining to beginning teacher experience in general. The conclusions are as follows.

There was a strong link between pre-service teacher education, inclusive of EfS, and the substantive adoption of EfS by beginning teachers. This link has often been assumed in the literature of environmental education, but literature addressing beginning teaching suggests that such an assumption need not hold (Wideen, Mayer-Smith & Moon, 1998; Flores & Day, 2005). All five of the beginning teachers were

able to identify many components of pre-service EfS as beneficial for their teaching, but in addition, the three beginning teachers most conscientious in referring back to what they had learnt during university education were best positioned to include EfS in their work.

From the analysis of the case studies it has been reported that whilst the beginning teachers had experienced some environmental education in their own schooling, none had experienced EfS as school students. Furthermore, at the commencement of their final pre-service year, the beginning teachers were largely unaware of the mandatory NSW DET *Policy on Environmental Education for Schools* (2001a). Similarly, in only one of five cases did the beginning teacher experience EfS expressed as whole school involvement during practicum or internship in the pre-service years. In conclusion it cannot be assumed that the beginning teachers were aware of their entitlement and responsibility to include EfS in their work, nor that they had experienced it in their own schooling or practicum. Therefore there is no particular reason why they would adopt it as part of their teacher identity and hence go on to include it in their work unless these matters were explicitly built into their pre-service education.

The case studies demonstrated that the beginning teachers commonly encountered considerable constraints on EfS practice within the workplace once they entered the profession. The primary constraints, from the five case studies, are as follows:

- In only one of five cases was the early career teacher working in a school where EfS was a part of the curriculum and culture of the school. In four out of five cases, the early career teachers were appointed to schools where EfS was often poorly understood by colleagues, not a part of school culture, and apparently of little consequence;
- Principals in four out of five cases, whilst being aware of the NSW DET *Policy on Environmental Education for Schools* (2001a), were not taking firm steps towards its implementation;
- In three out of five cases, school principals appeared to view EfS as a threat to the more urgent priorities of improved school performance in national tests of literacy and numeracy. One other principal acknowledged the importance of

environmental education but none-the-less felt compelled to set school priorities elsewhere. This remains a major impediment to the implementation of EfS;

- In all cases the beginning teachers worked in an environment where they were accountable to supervisors, grade teacher teams, principals and the NSW Institute of Teachers. None of the five was required to account for activities in EfS meaning that there was no official requirement or even expectation that it would occur despite the extant policy; and
- In all of the schools the beginning teachers were required to teach prescribed content and in some cases to use prescribed methods. In all cases the beginning teachers had little discretion in developing the scope and sequence of learning for their classes.

The workplace circumstances reported here are in many ways consistent with those reported by Walker (1995) and anticipated by Robottom and Hart (1993) in Australia and Stevenson (1987, 2007) in the USA. One key difference is that, contrary to the situation reported by Walker (1995), there are now abundant resources available to assist teachers with many aspects of sustainability teaching, notably the ‘action’ component. This study builds on the earlier conclusions of Walker (1995, 1997a) by reporting on the actions and reflections of beginning teachers and then links their understanding of EfS to their experience of EfS during pre-service teacher education.

Whilst pre-service teacher education contributed to the way in which EfS became incorporated into the work of the beginning teachers, the culture of disinterest operating in a school and other additional constraints could prove to be so great that individuals could lose their determination to continue. This clearly happened in one case and to some extent in one other. This conclusion confirms earlier work on experiences common amongst beginning teachers in general (Flores & Day, 2005), although not with specific reference to EfS.

Pre-service teacher education in EfS built an understanding of whole school EfS. As a result of their involvement in pre-service EfS, all five beginning teachers conceptualised EfS as a whole school process which required a team effort and a change orientation. However, four out of five beginning teachers entered schools to

find that there was no whole school EfS in operation and that implementing EfS was slower and more difficult than they had anticipated. This represents a mismatch between the beginning teacher aspirations of EfS and the reality of the schools described in four out of five cases. The conclusion arises that this mismatch must be addressed if the frustrations associated with EfS for beginning teachers are to be lessened and policy is to be implemented.

Conversely in only one case did the culture of the school create an expectation of participation in EfS. Where this was the case it did not necessarily follow that the beginning teacher would fulfil that expectation in a substantive way. Teachers have their own sense of teacher identity incorporating their particular interests and teaching goals (Pajares, 1992; Richardson, 1996). Interests other than EfS may prevail.

Some of the beginning teachers were able to use Jensen's (2002) model of action competence as a curriculum planning tool. From this it can be concluded that the model of action competence was a potentially useful tool in assisting teachers to apply EfS conceptualised as change towards sustainability. A similar conclusion has been drawn from work with pre-service teachers elsewhere (Gooch, et al., 2008).

The provision of rich learning experiences, beyond the classroom and into the local area, as well as opportunity to reflect on how such experiences could be organised for primary students, was an important component of this pre-service teacher education program. This conclusion arises because all of the beginning teachers displayed competence in working outside the classroom with their classes and remarked that they had valued out-of-classroom experiences during pre-service EfS. Whilst many studies have reported the benefits for school students of exploration of the out-of-classroom world in EfS (Skamp & Bergmann, 2001; Ballantyne & Packer, 2009) and for pre-service teachers (Whitehouse, 2008), there are other studies which have reported that working outside the classroom can inhibit teachers from engaging with environmental education (Skamp & Bergmann, 2001).

A pre-service teacher education that had a strong orientation to curriculum requirements was valued by the beginning teachers and encouraged the implementation of EfS. Where beginning teachers programmed for EfS, they drew

links to their pre-service work in EfS. Some of the beginning teachers specifically remarked on the benefits of practising the skill of integration of EfS into curriculum *themselves* during pre-service EfS. This observation resonates with Grossman's (1990) work on the importance of pedagogical content knowledge and with Gayford's (2004) work wherein a reflective and participatory approach to curriculum planning relevant to EfS was successfully used in a pre-service primary teacher situation.

Pre-service teacher education in EfS might benefit from emphasis on opportunities for pre-service teachers to explicitly identify those EfS concepts that they are intending to develop, and then to demonstrate how their students could be assisted to link the rich experiences that are advocated in EfS to the desired conceptual learning. Because EfS is not a KLA in NSW and not a part of the culture of many schools, its implementation by beginning teachers was dependent upon their ability and desire to identify and act upon EfS opportunities in their work. Teachers' core work is teaching to syllabus outcomes and it was those individuals with good skills in curriculum integration who were best positioned to include EfS.

Actual practice in implementing EfS in a supported situation was highly valued by pre-service teachers and contributed substantially to their confidence and desire to make EfS a part of their teaching. Specifically, two out of five of the beginning teachers took advantage of the opportunity in their final pre-service year to teach EfS concepts to primary students. As beginning teachers those two individuals remarked on the high value of that informal practice teaching experience. Two of the three who did not take advantage of that opportunity remarked upon how useful it would have been. There is support in the literature regarding the potential value of practice teaching in general (Cherubini, 2008) and some account of the value of practice and reflection on practice in EfS in a pre-service situation (Varga et al., 2007).

Beginning teachers in this study reported that pre-service EfS had captured their interest thus encouraging them to give it a try. Contributing to capturing their interest in EfS were strategies based on a constructivist approach in teacher education and this echoes Whitehouse (2008). The present study reported that from the point of view of the five beginning teachers, specific strategies such as inquiry learning, exploration of environments beyond the classroom both natural and technological, experience of

debates, games and other strategies used in EfS in classrooms, requiring participants to reflect on those strategies and how they could use them were all valuable in pre-service education. Also considered valuable was the opportunity to become familiar, during pre-service education, with an array of teaching resources useful in EfS. The value of coalescence between subject matter knowledge and pedagogical knowledge has been reported elsewhere (Grossman, 1990) and appears to apply to EfS for participants in this study.

Pre-service teacher education in EfS required a substantial amount of time and a clear sustainability focus. Pre-service teachers referred to the *experience* of EfS as adding to their desire and confidence to adopt it as a part of their repertoire of practice. The experiences of EfS included becoming more knowledgeable, gaining understanding of their own personal links to the environment and learning to translate these experiences into their teaching role. Pre-service teachers in this study undertook EfS over one semester as final year students. It had been anticipated that, because of the complexity of the task, final year pre-service teachers would be best placed to meet the demands of interpreting EfS in a cross-curricula way. The experiences of the beginning teachers in this study explain how it would be fanciful to imagine that they, imbued with enthusiasm but lacking in skills, understanding and experience of EfS, would be able to accomplish the transformative education to which proponents of EfS aspire especially where the school context mediates against this.

12.4 Implications

There are implications from this study for the many stakeholders who influence pre-service teacher education in EfS through their implementation of, or failure to implement, appropriate policies and actions.

Implications of Phase One

The pre-service teachers were concerned about the environment and believed that as teachers they could do something about it. It is therefore their right to have the opportunity to learn how they can do something about it in their professional capacity as teachers in Australia as they have the warrant to do. The implication of their reasons for their reported high levels of motivation and their improved levels of

confidence through pre-service teacher education is that, as is often assumed, their pre-service teacher education was beneficial in furthering EfS. In particular, content knowledge, pedagogical content knowledge, exposure to curriculum and the variety of teaching resources available for the purpose and actual practice in EfS should be a prominent part of their pre-service teacher education.

Implications of Phase Two

This study has demonstrated that EfS in pre-service teacher education was positively associated with beginning teacher effort in EfS in NSW schools. The implication is that substantial pre-service EfS should continue to be considered as a means of furthering the implementation of EfS in school education.

It was found that the pre-service teachers had limited experience, from their past, of how EfS could be materialised in schools. The implication is that pre-service teacher education was a crucial opportunity for information about policies on EfS to be promulgated and practices to be learned. Also necessary was a constructivist approach where pre-service teachers developed a conceptualisation of EfS, and the range of skills that they required for implementation, through particular experiences considered by them to be beneficial.

A further implication is that an optimal procedure at the level of pre-service education would have included provision of practicum, for as many as were interested, in schools where EfS is practised. As has been noted elsewhere (Beckford, 2008), finding schools where EfS is practised could be challenging, especially as the culture of any one school can abruptly shift in response to changes in school staffing. Greater flexibility for provision of teaching practice could be achieved through arrangements where pre-service teachers enter schools to teach as little as one or two lessons in EfS. Practice with small teaching segments in EfS has been shown to be effective not only in this study, but elsewhere (Varga, et al., 2007).

Beginning teachers encountered considerable constraints on EfS practice within the workplace once they entered the profession. The implication of this is that beginning teachers who desired to engage with EfS experienced various sources of frustration.

Because the constraint structures are part of a complex interaction between priorities and responsibilities, there are implications for many parties as discussed below.

Anecdotal evidence plus evidence from the case studies indicated that there is a strong culture of accountability in education (Windle, 2009) with principals being immediately accountable to regional authorities and local communities; beginning teachers being accountable to principals, teacher teams, supervising teachers, students, and, teacher registration authorities such as the NSW Institute of Teachers. Similarly teacher education providers are accountable to the teacher registration authority, to their students and to the profession. Because beginning teachers were not accountable for their *EfS* activities to supervisors, grade teacher teams, principals and the NSW Institute of Teachers, but remained accountable for other priorities in the school, there was little encouragement for them to direct their energies into *EfS*. The lack of accountability for *EfS* tacitly conveys the message that it is unimportant and not valued. In this situation, whether or not beginning teachers engaged with *EfS* was very much dependent on their own interests and goals and in some cases those of their immediate colleagues in the schools.

Given that in four out of five cases, principals claimed that they felt compelled to prioritise English and mathematics on the grounds of their accountability to various other stakeholders, it would seem that progress in elevating the status of *EfS* may require a change in the current order of items subject to accountability. However, in the present educational and political climate this seems unrealistic. The implication is that an alternative approach is necessary. An alternative would be to elevate the perception that *EfS* is a necessary element of English and mathematics education, not only of science education as is commonly perceived. Sustainability has recently been incorporated into the draft science syllabus of the National Curriculum (Australian Curriculum Reporting and Assessment Authority, 2009) but its explicit incorporation into other syllabus areas is necessary. Additionally steps can be taken to elevate the perception that *EfS* can be profitably aligned with the parameters of Quality Teaching. The *general* implication is that there must be greater accountability for *EfS* at every level in the sense that it should become an explicit element within curriculum, assessment and professional learning. Where sustainability was firmly planned in the

curriculum and professional learning of one case study school, a strong culture of sustainability was successfully developed.

Examples from this study show that because EfS is not a part of the culture of many schools (Tilbury, Coleman & Garlick, 2005) there was an unavoidable gap between beginning teachers' experiences of their own school education and EfS as presented in this study in pre-service teacher education. One implication of this is that pre-service teachers should have had more realistic information about the varied contexts of schools, in relation to EfS, thereby allowing them to better prepare themselves for implementation. Some knowledge of the politics of schools may also have been useful. Of course it would be preferable if schools were to rise to the challenge of whole school EfS such that beginning teachers would feel more comfortable in their sustainability teaching.

In a converse situation, there was an example in this study where a beginning teacher remained amenable to, but somewhat detached from EfS within a rich sustainability culture, despite pre-service EfS work. This suggests that, as has been reported (Pajares, 1992), personal aspirations as well as the work context of individuals are particularly significant in determining what they choose to do. The implication of this is that it would have been advantageous if pre-service teacher education had incorporated EfS into all curriculum areas so that teachers could have seen the relevance of it to their particular area of expertise, and acquired the skills to integrate EfS concepts into the work that is of particular interest to them.

Similar to a report concerning tertiary educators and EfS (Ferreira, et al., 2009), it has been concluded from this study that helping pre-service teachers to conceptualise EfS as a change process assisted the progress of beginning teachers. The model used for this purpose, Jensen's (2002) model of action competence, was not always comprehensible to individuals at a pre-service level but became more accessible with teaching experience. An implication of this is that other models (see for example Jenkins, 2009) could be sought to assist with the overall conceptualisation of EfS. Alternatively work with the action competence model could be strengthened during pre-service education. Considerable work with the use of Jensen's (2002) model has been accomplished since the commencement of this study (Eames, Cowie & Bolstad,

2008; Wilson-Hill, Law & Eames, 2008) and demands further attention by those undertaking pre-service teacher education in EfS.

Closely related is the finding that whilst some beginning teachers were able to integrate EfS into the core business of the school with ease, that is, curriculum implementation, others found difficulty performing this essential task. The implication, once again, is that the skills of curriculum integration of EfS were a particularly important element of pre-service teacher education and may indeed have been best studied within the various specific curriculum areas typically maintained at the tertiary level. As well as the work of the present study, an insightful example of how pre-service teachers have been assisted with integration of EfS into science at the primary level has been provided by Gayford (2004).

Finally there are implications from the conclusion that an extended focus on EfS in pre-service teacher education was necessary. The implication of this is that a piecemeal and ad hoc implementation of EfS in pre-service education would likely be inadequate. There are implications for the debate about EfS in pre-service education organised as a single focused unit, or as recently proposed, in a mainstreamed way (Ferreira, Ryan & Tilbury, 2007, 2007b; Ferreira, et al., 2009; Steele, 2010) where the potential for entire systems as a whole to influence a conceptualisation of sustainability is envisioned. The evidence from the present study implies that pre-service teacher education should have more strongly emphasised elements such as assisting individuals to develop a conceptualisation of EfS that they could apply to that part of teaching they particularly wished to pursue and that a sustained effort over an even more substantial period would have been beneficial. Also notions of a cohesive education beyond subject divisions were important and these included a whole school approach and skills of curriculum integration. The implication of the importance of these elements for a mainstreaming model of EfS in teacher education is that care should be taken to incorporate them into the overall course offered to students in a planned and cohesive way.

In the following section there is a series of recommendations made in response to the question:

How can pre-service teacher education better prepare beginning teachers in Education for Sustainability?

12.5 Recommendations

On the basis of this research, and the wider research literature, it is possible to make a series of specific recommendations in order to better prepare beginning teachers in EfS, with particular reference to the present study site. Attention should first be drawn to the fact that it is not only the pre-service teacher education providers, that is, the universities, who are responsible for teacher preparation. Effective teacher preparation is based upon a strong partnership between universities, education systems that are teacher employers, those registering the teacher education providers, schools, and those preparing and testing curriculum implementation. The implications of this research suggest that there are recommendations for all parties concerned meaning system wide change.

For the teacher education provider

It is recommended that the teacher education provider:

- Offer substantial pre-service teacher education in EfS where teachers' obligations and entitlements in EfS are made clear. At the present time, although the ideal of systemic change towards sustainability (Ferreira, et al., 2009) is acknowledged, it seems that a nominated unit of study that is focused in a holistic way upon the knowledge and competencies which teachers require in EfS is necessary. Pre-service teacher education in EfS would adopt constructivist principles where pre-service teachers are given opportunities to build a deep conceptualisation of EfS through a variety of relevant experiences, combined with opportunity to link those experiences to their teaching role and their interests. Pre-service teacher education in EfS would also offer explicit opportunities for pre-service teachers to reflect upon the context of schools such as those in their own experience and those described in this study and how this reality may differ from the aspirations of EfS. The purpose would be that each individual may contemplate realistic potential accomplishments and ways forward in order to lessen the frustrations of a mismatch between reality and aspiration;

- Put in place policies and practices that EfS should be a part of all relevant units in undergraduate teaching degrees such that beginning teachers become competent to integrate EfS into the broad school curriculum as an everyday part of schools' core business. These would be a part of an institution-wide effort to include sustainability thinking in policy, teaching and operations such that a culture of sustainability is promulgated; and
- Co-ordinate with schools to offer practicum and other authentic school experiences in EfS to pre-service teachers.

For schools

Schools have responsibility to nurture beginning teachers and pre-service teachers. It is therefore recommended that principals and other school leaders involved:

- Develop a culture of sustainability in their schools so that visiting pre-service teachers could experience EfS at its best. For this to be achieved, it is recommended that principals initiate, encourage, publicise, resource, reward and assist whole school implementation of EfS in their schools consistent with policies such as that which applies here in NSW. Scheduled professional learning time for EfS would enable existing teachers to conceptualise the notion of sustainability, and how they could contribute to a culture of sustainability through their own expertise;
- Require that EfS be visible in the scope and sequence of learning for each stage in the school, and in the teaching programs of both supervising and pre-service teachers on practicum, in line with policies of EfS;
- Assist by co-ordinating with the university to invite pre-service teachers into the school, for the purpose of teaching EfS even if only on a single lesson basis; and
- Make available information that they practise whole school EfS.

For systems of school education

School education systems require schools to be accountable for their work. It is therefore recommended that:

- Education systems require that schools be commonly accountable for the implementation of policies such as the NSW DET *Policy on Environmental*

Education for Schools (2001a) such that regional managers and school principals believe that EfS is deemed of primary importance. Visiting pre-service teachers would then receive the message that sustainability was valued in schools;

- Education systems provide public recognition for the efforts of teachers and schools in EfS and that there continue to be rewards for excellence in EfS. Through this and other means the status of EfS in school education should be raised so that it is more highly valued by principals and communities. Pre-service teachers would therefore appreciate the importance of EfS in undergraduate work;
- Decision makers reflect upon the effect of an accountability system that privileges literacy and numeracy via the machinery of the NAPLAN testing and what this means for the development of the whole child; and
- Education systems organise in-service EfS for teachers such as by encouraging consultancy teams to incorporate EfS into their repertoires of practice, so that teachers in schools will come to better understand the application and significance of EfS to their work and that of novice teachers in their schools.

For research

From this study it is clear that research into the practicalities and efficacy of EfS in tertiary education is in its infancy and far more needs to be known. Further questions that arise from the research are:

- What is the role of experience and scaffolded reflection by individuals in their development of an operational conceptualisation of EfS during pre-service teacher education?
- Building on the work of Gooch, et al. (2008) and of this study, what is the most efficacious way in which to assist the pre-service teacher to develop the skills of curriculum planning that incorporates EfS?;
- What are the most efficacious and practical arrangements for pre-service teacher practice in EfS?

Additionally particular aspects of the application of EfS in schools need to be researched in a way that informs pre-service teacher education. Further research questions arising are:

- Which EfS concepts are developmentally appropriate for different stage levels?
- How can EfS concepts be most efficaciously sequenced throughout the curriculum such that curriculum integration by pre-service teachers can be better informed?
- What principles and practical ideas can be derived from operational examples of whole school EfS, such that whole school EfS in the primary school can be explored by pre-service teachers in a manner that develops their practical skills in this area?
- Building on the work of Lang (1999/2000), Gough (2004a), Ladwig, Mockler and Ross (2010) and Summers, Corney and Childs (2003),
 - what are the most efficacious ways of developing the EfS skills of practising teachers, so that when beginning teachers enter schools, they are more likely to find colleagues and mentors experienced in EfS?
 - How can teachers be encouraged and supported to move from a position of care, to one of actively seeking ways of incorporating EfS in their day to day work?

For bodies who set standards for the registration of teachers and for the registration of teacher education providers

It is recommended that bodies registering teacher education providers:

- Require EfS components in their standards and descriptors in a way that revitalises EfS as a component part of the university's offerings for pre-service teachers. This could build on the work reported by Cutter-Mackenzie, Clarke and Smith (2008); and
- Establish that portfolios produced to attain proficiency awards offered to teachers should showcase integration of EfS into curriculum. In this way the depth of knowledge and competence in EfS amongst teachers in schools will grow and this will contribute to the development of EfS capacities amongst visiting pre-service teachers.

For bodies who prepare curriculum documents for schools:

So that pre-service teachers are working with a curriculum rich in EfS and so that it is apparent to them that sustainability is a valued and essential part of school education, it is recommended that those preparing curriculum:

- Require that expectations pertaining to EfS be written into all new syllabuses; and
- Include understandings relating to sustainability within all scheduled system wide assessment for as long as this continues as a school accountability measure.

12.6 Reflections on the research process

A longitudinal design was necessary for this study in order to answer the research question. More trustworthy results could have been obtained had the interval between phases one and two been increased, or had a third and later phase been added. This is because beginning teachers are pre-occupied with many issues during their first year. As an example, further case studies at a later time interval could reveal that experience had resolved some of the issues of curriculum planning that the beginning teachers countenanced.

Most classes to which the beginning teachers in this study were assigned were clustered in Stage 1, wherein children hold developmentally limited knowledge of environmental issues. More reliable commentary on the undercurrent of socially critical theory inherent in contemporary EfS may have been possible with later stages.

One advantage of a study where a single researcher holds responsibility for most of the action is that this person has a full and intimate knowledge of the project. However a disadvantage is that the range of viewpoints arising through consultation in a research team, where the validity of interpretations can be discussed, cannot be drawn upon.

This dissertation reports on the experience of beginning teachers in EfS as interpreted by the tertiary teacher/researcher. It is for readers to determine whether by analogy,

the conclusions and recommendations of the study are of relevance to them. By its nature, the study cannot of itself claim to be generalisable to other spheres of teacher education and beginning teacher practice, but in the manner proposed by Stevenson (2004) it may suggest new ways of thinking or ideas to try.

12.7 Final remarks

This study has opened a number of the debates surrounding EfS. Foremost amongst them is the enduring debate in which environmental education conceptualised as a means of modifying behaviour, is seen as distinct from participation in a critical process of cultural change, wherein sustainability is embedded within social systems or organisations. These conceptualisations of environmental education are regarded by many as incompatible (Breiting, 2009), but Vare and Scott (2007), with their conceptualisation of ESD 1 and ESD 2 argued for an outlook that accommodates both. Through investigation of the practices of beginning teachers and their schools, this study raises the possibility that individual teachers can adopt the accommodating position offered by Vare and Scott (2007) and that an either/or conceptualisation of environmental education may be inappropriate for schools. At the very least, the experiences reported in the case studies provide good grounds for the pragmatic approach of Scott and Oulten (1999) who argue the case for multiple approaches in environmental education. Supporting the case for multiple approaches is the finding that each teacher has particular interests and strengths that contribute to the purposes of EfS and each is able to adapt his or her desire to incorporate EfS in teaching, appropriate to the particular context of the school. To marginalise an individual teacher's efforts because it is outside the orthodoxy of a particular theory is counterproductive and overlooks the potential advantages of a diversity of approaches in EfS.

In teacher education it is necessary to adopt an approach wherein pre-service teachers are provided with a wide range of EfS experiences from which they can construct a conceptualisation of EfS. The findings from this research suggest that provision of experiences is of itself insufficient. Necessary also is the requirement that pre-service teachers should intentionally reflect upon those experiences and appraise them within

probable school contexts, to develop an understanding of how they are relevant to their teacher identity and of what EfS could mean for them.

A further debate opened by this study centres on the position of values and attitudes in EfS. Tilbury and Cooke (2005:18) maintain that in EfS ‘the focus is on developing thinking, clarifying values and enhancing participation skills’, not on teaching values *per se*. This was the intended position adopted by the tutors in pre-service teacher education in this study. However it is the position adopted in neither the NSW DET *Environmental Education Policy for Schools* (2001a:11), which states that students should develop ‘a respect for life on Earth’, nor in the *National Environmental Education Statement for Schools* (ADEH, 2005). In line with policy, and contrary to the position of Tilbury and Cooke (2005), beginning teachers in this study were deeply concerned to develop in their children a concern for the environment. This has been reported elsewhere (Hart, 2003) and is compatible with the notion that teaching is an emotional practice wherein individuals’ personal purposes in teaching are central to the decisions they make (Hargreaves, 1998).

The earlier definition of EfS offered by Tilbury (1995:201) included ‘teaching values’ and in particular the ‘development of an environmental ethic’, promoting the principal value of ‘concern for all life forms’. In NSW, teachers are expected to teach core values including care, responsibility and participation, and one anticipated outcome of values teaching in NSW is development of ecologically sustainable practices (Refshauge, 2004). Tilbury and Cooke (2005:18) argue that values should not be taught and to do so would be pointless because ‘there is no direct link between those who have an affinity with nature and natural environments and their ability to contribute to sustainability within their personal and professional lives’. Whilst this may well be the case, the literature pertaining to environmental education provides abundant argument that affinity with natural places may provoke the *desire* to contribute to change towards sustainability (Fien, 2003; Hart, 2003; Chawla & Cushing, 2007; Martin, 2007; Malone, 2008). The present study provides examples of individuals for whom this holds true and who translate their own sense of care into their conceptualisation of EfS. Although attention has been drawn to the debate about direct teaching of values, it seems in many ways to be a non-issue. This is because values are *implicit* in the work of teachers who choose to broach EfS in their work.

It is evident that most if not all pre-service teachers in this study care about the future and the environment. This work demonstrates that translating that care into a viable repertoire of EfS practice requires determination and skill. It may be that the priority of priorities is teacher education in EfS. However this can only materialise where tertiary teachers scrutinise their own areas of expertise to develop *their* repertoire of practice, in a way that enables pre-service teachers to exploit a personal sense of care, and develop competence in EfS.

References

- AAEE. (2009). Australian Association for Environmental Education Position on the National Curriculum. Retrieved August 2009, from www.aee.org.au
- ADEH. (2005). *Educating for a Sustainable Future: A National Environmental Education Statement for Australian Schools*: Australian Department of Environment and Heritage. Curriculum Corporation.
- AGDEWHA. (2007, May 2009). Australian Sustainable Schools Initiative (AuSSI). (Australian Government Department of Environment Water Heritage and the Arts). Retrieved May 2009, from www.environment.gov.au
- AGDEWHA. (2009). *Living Sustainably: The Australian Government's National Action Plan for Education for Sustainability*: Australian Government Department of Environment Water Heritage and the Arts. Canberra.
- AGDEWHA. (2010). Sustainability Curriculum Framework: A guide for curriculum developers and policy makers. Australian Government Department of Environment Water Heritage and the Arts. Accessed June 2010. Retrieved from www.environment.gov.au
- Aleixandre, M., & Rodriguez, R. (2001). Designing a field code: environmental values in primary school. *Environmental Education Research*, 7(1), 5 - 22.
- Applebee, A., Burroughs, R., & Cruz, G. (2000). Curricular conversations in Elementary School Classrooms. In S. Wineberg & P. Grossman (Eds.), *Interdisciplinary Curriculum: Challenges to Implementation*. NY: Teachers' College Press.
- ARIES. (2009). Education for Sustainability: The role of education in engaging and equipping people for change: Australian Research Institute for Environment and Sustainability for the Australian Government Department of Environment Water Heritage and the Arts.
- Australian Curriculum Reporting and Assessment Authority. (2009). Australian Curriculum. Retrieved 11.11.09, from www.acara.edu.au/curriculum.html
- Australian Government Department of Education Employment and Workplace Relations. (2010). Smarter Schools National Partnerships. Retrieved June 2010, from <http://www.deewr.gov.au/schooling/programs/smarterschools>
- Bader, B. (2004). Epistemological renewal and environmental education: Science in context. *Australian Journal of Environmental Education*, 20(2), 13-21.
- Bailin, S., Case, R., Coombs, J., & Daniels, L. (1999). Common misconceptions of critical thinking. *Journal of Curriculum Studies*, 31(3), 269-283.
- Ballantyne, R. (1995). Environmental teacher education: Constraints, approaches and course design. *International Journal of Environmental Education and Information*, 14(2), 115-128.
- Ballantyne, R., & Packer, J. (2009). Introducing a fifth pedagogy: Experience-based strategies for facilitating learning in natural environments. *Environmental Education Research*, 15(2), 243-262.
- Bandura, A. (1997). *Self-efficacy: The Exercise of Control*. New York: W. H. Freeman and Company.

- Barrett, M. J. (2007). Homework and fieldwork: investigations into the rhetoric-reality gap in environmental education research and pedagogy. *Environmental Education Research*, 13(2), 209-224.
- Bazeley, P. (2007). *Qualitative Data Analysis With NVivo* (2nd ed.): Sage Publications.
- Beckford, C. (2008). Re-orienting Environmental Education in teacher education programs in Ontario. *Journal of Teaching and Learning*, 5(1), 55-66.
- Best, J., & Kahn, J. (2006). *Research in Education* (10th ed.): Pearson.
- Bixler, R., Carlisle, C., Hammitt, W., & Floyd, M. (1994). Observed fears and discomforts among urban students on fieldtrips to wildland areas. *The Journal of Environmental Education*, 26(1), 24-33.
- Blanchet-Cohen, N. (2008). Taking a stance: Child agency across the dimensions of early adolescents' environmental involvement. *Environmental Education Research*, 14(3), 257-272.
- Board of Studies NSW. K-6 Syllabuses. Retrieved March 2010, from <http://www.boardofstudies.nsw.edu.au>
- Board of Studies NSW. (1998). *Human Society and its Environment Syllabus K-6*. Sydney.
- Bonnett, M., & Williams, J. (1998). Environmental education and primary children's attitudes towards nature and the environment. *Cambridge Journal of Education*, 28(2), 159-174.
- Bore, A. (2006). Creativity, continuity and context in teacher education: Lessons from the field. *Australian Journal of Environmental Education*, 22(1), 31-38.
- Boyes, E., & Stanisstreet, M. (1993). The 'Greenhouse Effect': children's perceptions of causes, consequences and cures. *International Journal of Science Education*, 15(5), 531-552.
- Boylan, C., & Collin, K. (2006). Developing a partnership between the Riverina Environmental Education Centre and Charles Sturt University. *Australian Journal of Environmental Education*, 22(2), 3-12.
- Breiting, S. (2009). Issues for environmental education and ESD research development: Looking ahead from WEEC 2007 in Durban. *Environmental Education Research*, 15(2), 199-207.
- Breiting, S., Mayer, M., & Mogensen, F. (2005). Quality Criteria for ESD Schools. Retrieved 8 March 2008, from http://seed.schule.at/uploads/QC_eng_2web.pdf
- Breiting, S., & Wickenberg, P. (2010). The progressive development of environmental education in Sweden and Denmark. *Environmental Education Research*, 16(1), 9-31.
- Bryman, A. (1988). *Quantity and Quality in Social Research*. London: Unwin Hyman.
- Bullough, R. (1997). Becoming a teacher: Self and the social location of teacher education. In B. Biddle, T. Good & I. Goodson (Eds.), *International Handbook of Teachers and Teaching* (Vol. 1, pp. 79-134): Kluwer Academic Publishers.
- Butler, K. (2009). Draft Learning for Sustainability K-10 Curriculum Framework. Sydney: NSW DET Curriculum K-12 Directorate.
- Chapman, D. (2007). Education for Sustainability: Looking for directions. In I. Bjorneloo & E. Nyberg (Eds.), *Drivers and Barriers for Implementing Learning for Sustainable Development in Pre-School through Upper Secondary and Teacher Education. UNESCO Education for Sustainable Development in Action Technical Paper No 4* (pp. 125-130). Goteberg.

- Chatzifotiou, A. (2006). Environmental education, national curriculum and primary school teachers. Findings of a research study in England and possible implications upon education for sustainable development. *The Curriculum Journal*, 17(4), 367-381.
- Chawla, L., & Cushing, D. (2007). Education for strategic environmental behaviour. *Environmental Education Research*, 13(4), 437-452.
- Cherubini, L. (2008). Teacher candidates' perceptions of school culture: A mixed methods investigation. *Journal of Teaching and Learning*, 5(2), 40-54.
- Cohen, L., Manion, L., & Morrison, K. (2001). *Research Methods in Education* (5th ed.). London and New York: Routledge Falmer.
- Comber, B., Nixon, H., & Reid, J. (Eds.). (2007). *Literacies in Place: Teaching Environmental Communication*: PETA.
- Connell, S., Fien, J., Lee, J., Sykes, H., & Yencken, D. (1999). 'If it doesn't directly affect you, you don't think about it': A qualitative study of young people's environmental attitudes in two Australian cities. *Environmental Education Research*, 5(1), 95-114.
- Connell, S., Fien, J., Sykes, H., & Yencken, D. (1998). Young people and the environment in Australia: Beliefs, knowledge, commitment and educational implications. *Australian Journal of Environmental Education*, 14, 39-48.
- Cotton, D. (2006). Implementing curriculum guidance on environmental education: The importance of teachers' beliefs. *Journal of Curriculum Studies*, 38(1), 67-83.
- Courtney-Hall, P., & Rogers, L. (2002). Gaps in Mind: problems in environmental knowledge-behaviour modelling research. *Environmental Education Research*, 8(3), 283-297.
- Creswell, J. (1998). *Qualitative Inquiry and Research Design: Choosing Among Five Traditions*. California: Thousand Oaks: Sage Publications.
- Creswell, J. (2003). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches* (2nd ed.). California: Thousand Oaks.
- Cross, R. (1998). Teachers' views about what to do about sustainable development. *Environmental Education Research*, 4(1), 41-53.
- Cutter-Mackenzie, A., Clarke, B., & Smith, P. (2008). A discussion paper: The development of professional teacher standards in environmental education. *Australian Journal of Environmental Education*, 24, 3-10.
- Cutter-Mackenzie, A., & Smith, R. (2003). Ecological literacy: The 'missing paradigm' in environmental education (part one). *Environmental Education Research*, 9(4), 497-524.
- Darner, R. (2008). Self-Determination Theory as a Guide to Fostering Environmental Motivation. *The Journal of Environmental Education*, 40(2), 39-49.
- Dillon, J. (2003). On learners and learning in environmental education: Missing theories, ignored communities. *Environmental Education Research*, 9(2), 215-226.
- Dinham, S. (2001). *Changing Classrooms*. Paper presented at the NSW Secondary Principals' Annual State Conference, Pokolbin.
- Dinham, S., & Bhindi, N. (2005). Trends and imperatives in educational leadership. In New South Wales Department of Education and Training (Ed.), *Report of the Consultation on Future Directions for Public Education and Training*. Sydney.
- Dove, J. (1996). Student teacher understanding of the greenhouse effect, ozone layer depletion and acid rain. *Environmental Education Research*, 2(1), 89-100.

- Dworkin, A., Saha, L., & Antwanette, N. (2003). Teacher burnout and perceptions of a democratic school environment. *International Education Journal*, 4(2), 108-120.
- Eames, C., Cowie, B., & Bolstad, R. (2008). An evaluation of characteristics of environmental education practice in New Zealand schools. *Environmental Education Research*, 14(1), 35-51.
- Education Queensland. (2002). Productive pedagogies: Classroom reflection manual. Brisbane Queensland: The State of Queensland (Education Dept).
- Elliott, J. (1999). Sustainable society and environmental education: Future perspectives and demands for the educational system. *Cambridge Journal of Education*, 29(3), 325-340.
- Ernst, J. (2009). Influences on US middle school teachers' use of environment-based education. *Environmental Education Research*, 15(1), 71-92.
- Ernst, J., & Monroe, M. (2004). The effects of environment-based education on students' critical thinking skills and disposition toward critical thinking. *Environmental Education Research*, 10(4), 507-522.
- Ernst, J., & Monroe, M. (2006). The effects of environment-based education on students' critical thinking skills and disposition toward critical thinking. *Environmental Education Research*, 12(3-4), 429-443 (reprint of 2004 paper).
- Ferreira, J. (2009). Unsettling orthodoxies: education for the environment/for sustainability. *Environmental Education Research*, 15(5), 607-620.
- Ferreira, J., Ryan, L., Davis, J., Cavanagh, M., & Thomas, J. (2009). *Mainstreaming Sustainability into Pre-service Teacher Education in Australia*. Macquarie Univ Sydney: Australian Government Department of the Environment, Water, Heritage and the Arts and the Australian Research Institute in Education for Sustainability (ARIES).
- Ferreira, J., Ryan, L., & Tilbury, D. (2006). *Whole School Approaches to Sustainability: A review of models for professional development in pre-service teacher education*. Canberra: Australian Government Department of the Environment and Heritage and the Australian Research Institute in Education for Sustainability (ARIES).
- Ferreira, J., Ryan, L., & Tilbury, D. (2007). Planning for success: Factors influencing change in teacher education. *Australian Journal of Environmental Education*, 23, 45-56.
- Ferreira, J., Ryan, L., & Tilbury, D. (2007b). Mainstreaming education for sustainable development in initial teacher education in Australia: A review of existing professional development models. *Journal of Education for Teaching*, 33(2), 225-239.
- Fien, J. (1993a). *Education for the environment: Critical curriculum theorising and environmental education*. Geelong: Deakin University.
- Fien, J. (1993b). *Environmental Education: Pathway to Sustainability*: Deakin University and Griffith University.
- Fien, J. (1999/2000). Education, sustainability and civil society. *Australian Journal of Environmental Education*, 15/16, 129-132.
- Fien, J. (2000). Listening to the voice of youth: Implications for educational reform. In D. Yencken, J. Fien & H. Sykes (Eds.), *Environment, Education and Society in the Asia-Pacific : Local Traditions and Global Discourses* (pp. 251-277): Routledge.
- Fien, J. (2003). Learning to care: Education and compassion. Retrieved 12 July 2007, from www.griffith.edu.au/ins/collections/profleets/fien03.pdf

- Firth, R., & Winter, C. (2007). Constructing education for sustainable development. *Environmental Education Research*, 13(5), 599-621.
- Fleer, M. (2002). Curriculum compartmentalisation?: A futures perspective on environmental education. *Environmental Education Research*, 8(2), 137-154.
- Flogaitis, E. (2003). Kindergarten teachers' conceptions about nature and the environment. *Environmental Education Research*, 9(4), 461-478.
- Flores, M., & Day, C. (2005). Contexts which shape and reshape new teachers' identities: A multi-perspective study. *Teaching and Teacher Education*, 22(2), 219-232.
- Flowers, R., & Chodkiewicz, A. (2009). Local communities and schools tackling sustainability and climate change. *Australian Journal of Environmental Education*, 25, 71-81.
- Frid, S., Redden, T., & Reading, C. (1998). Are teachers born or made? In T. Maxwell (Ed.), *The Context of Teaching* (pp. 325-359). Armidale: Kardooair Press.
- Fullan, M. (1992). Teacher Development and Educational Change. In M. Fullan & A. Hargreaves (Eds.), *Teacher Development and Educational Change*. London: The Falmer Press.
- Funnell, S., & Larri, L. (2005). *Evaluation: NSW Sustainable Schools Program*. Sydney: NSW DET and DEC
- Furlong, J., & Maynard, T. (1995). *Mentoring Student Teachers: The Growth of Professional Knowledge*. London: Routledge.
- Gall, M., Gall, J., & Borg, W. (2007). *Educational Research: An Introduction* (8 ed.). Boston: Pearson.
- Gascoyne, J. (2007). Weeding verbasum. In J. Ried, H. Nixon & B. Comber (Eds.), *Literacies in Place: Teaching Environmental Connections* (pp. 112-128). Sydney: Primary English Teachers' Association.
- Gayford, C. (2000). Biodiversity education: A teacher's perspective. *Environmental Education Research*, 6(4), 348-361.
- Gayford, C. (2004). A model for planning and evaluation of aspects of education for sustainability for students training to teach science in primary schools. *Environmental Education Research*, 10(4), 255-272.
- Gooch, M., Rigano, D., Hickey, R., & Fein, J. (2008). How do pre-service primary teachers in an regional Australian university plan for teaching, learning and acting in environmentally responsible ways? *Environmental Education Research*, 14(2), 175-186.
- Gough, A. (1997). *Education and the Environment: Policy, Trends and the Problems of Marginalisation*. Melbourne: Australian Council for Educational Research Ltd.
- Gough, A. (2004a). Achieving 'sustainability education' in primary schools as a result of the Victorian Science in Schools Research Project. *Australian Journal of Environmental Education*, 20(2), 31-40.
- Gough, A. (2006). A long, winding and (rocky) road to environmental education for sustainability in 2006. *Australian Journal of Environmental Education*, 22(1), 71-76.
- Gough, N. (1999). *Sustaining millennial hopes: Environmental education and young Australians*. Paper presented at the International Symposium on Youth Education, Tokyo, Japan.

- Grace, M., & Sharp, J. (2000). Exploring the actual and potential rhetoric-reality gaps in environmental education and their implications for pre-service teacher training. *Environmental Education Research*, 6(4), 331-345.
- Gralton, A., Sinclair, M., & Purnell, K. (2004). Changes in attitudes, beliefs and behaviour: A critical review of research into the impacts of environmental education initiatives. *Australian Journal of Environmental Education*, 20(2), 41-52.
- Greenwood, D. (2008). A critical pedagogy of place: From gridlock to parallax. *Environmental Education Research*, 14(3), 336-348.
- Grossman, P. (1990). *The Making of a Teacher: teacher knowledge and teacher education*. New York: Teachers College Press.
- Gruenewald, D. (2003). The best of both worlds: A critical pedagogy of place. *Education Researcher*, 32(4), 3-12.
- Gruenewald, D., & Manteaw, B. (2007). Oil and water still: How No Child Left Behind limits and distorts environmental education in US schools. *Environmental Education Research*, 13(2), 171-188.
- Guttek, G. (1988). *Philosophical and Ideological Perspectives on Education*. New Jersey: Prentice-Hall.
- Hardyck, C., & Petrinovich, L. (1975). Evaluating survey research studies. In W. B. Saunders (Ed.), *Understanding Research in the Social Sciences* (pp. 41-56).
- Hargreaves, A. (1998). The emotional practice of teaching. *Teaching and Teacher Education*, 14(8), 835-854.
- Hart, P. (1996). Problematizing enquiry in environmental education: Issues of method in a study of teacher thinking and practice. *Canadian Journal of Environmental Education*, 1, 56-86.
- Hart, P. (2003). *Teachers' Thinking in Environmental Education*. New York.
- Hebert, E., & Worthy, T. (2000). Does the first year of teaching have to be a bad one? A case study of success. *Teaching and Teacher Education*, 17(8), 897-911.
- Heimlich, J., & Ardoin, N. (2008). Understanding behaviour to understand behaviour change: A literature review. *Environmental Education Research*, 14(3), 215-237.
- Henderson, K., & Tilbury, D. (2004). *Whole-School Approaches to Sustainability: An International Review of Sustainable School Programs: Report prepared by the Australian Research Institute in Education for Sustainability (ARIES) for the Department of Environment and Heritage, Australian Government*.
- Howitt, C. (2007). Pre-service elementary teachers' perceptions of factors in an holistic methods course influencing their confidence in teaching science. *Research in Science Education*, 37(1), 42-57.
- Hoy, A. (2000). *Changes in teacher efficacy during the early years of teaching*. Paper presented at the Qualitative and Quantitative Approaches to Examining Efficacy in Teaching and Learning Session 43:22. American Education Research Association, New Orleans, LA.
- Huckle, J. (2005a). Educating for sustainable development: A briefing paper for the Teacher Training Agency. Retrieved November 2005, from <http://www.ttrb.ac.uk/viewArticle.aspx?contentId=11693>
- Huckle, J. (2005b). *Primary education for sustainable development*. Paper presented at the The Angela Walker lecture given during Values Week 2005 at Nottingham Trent University (electronic version retrieved Nov 2005) <http://www.john.huckle.org.uk>.

- Hungerford, H., & Volk, T. (1990). Changing learner behaviour through environmental education. *Journal of Environmental Education*, 21(3), 8-17.
- Jenkins, K. (1999/2000). Listening to secondary pre-service teachers: Implications for teacher education. *Australian Journal of Environmental Education*, 15/16, 45-56.
- Jenkins, K. (2009). Linking theory to practice: Education for Sustainability and learning and teaching. In M. Littledyke, N. Taylor & C. Eames (Eds.), *Education for Sustainability in the Primary Curriculum* (pp. 29-38). Melbourne: Palgrave Macmillan.
- Jensen, B. (2002). Knowledge, action and pro-environmental behaviour. *Environmental Education Research*, 8(3), 325-334.
- Jickling, B. (2006). The Decade of Education for Sustainable Development: A useful platform? Or an annoying distraction? A Canadian Perspective. *Australian Journal of Environmental Education*, 22(1), 99-104.
- Jickling, B., & Spork, H. (1998). Education for the environment: A critique. *Environmental Education Research*, 4(3), 309-328.
- Jones, M. (2009). Transformational learners: Transformational teachers. *Australian Journal of Teacher Education*, 34(2), 15-27.
- Jones, M., & Maxwell, T. (2008). *Scaffolded and unscaffolded reflection on Bachelor of Education Students' Learner Self-Efficacy*. Paper presented at the International Education Research Conference of the AARE 2007. Accessed June 2010. Retrieved from <http://www.are.edu.au/07pap/code07.htm>
- Kagan, D. (1992). Professional growth among pre-service and beginning teachers. *Review of Educational Research*, 62(2), 129-169.
- Keliher, V. (1997). Children's perceptions of nature. *International Research in Geographical and Environmental Education*, 6(3), 240-243.
- Kennelly, J., Taylor, N., & Jenkins, K. (2008). Listening to teachers: Teacher and student roles in the New South Wales Sustainable Schools Programme. *Environmental Education Research*, 14(1), 53-64.
- Kennelly, J., Taylor, N., & Maxwell, T. (2008). A student teacher's personal pathway to education for sustainability. *Australian Journal of Environmental Education*, 24, 23-34.
- Khalid, T. (2001). Pre-service teachers' misconceptions regarding three environmental issues. *Canadian Journal of Environmental Education*, 6, 102-120.
- Knapp, D., & Poff, R. (2001). A qualitative analysis of the immediate and short term impact of an environmental interpretive program. *Environmental Education Research*, 7(1), 56-65.
- Kollmuss, A., & Agyeman, J. (2002). Mind the gap: Why do people act environmentally and what are the barriers to pro-environmental behaviour? *Environmental Education Research*, 8(3), 239-260.
- Krasny, M. (2009). A response to Scott's concerns about the relevance of environmental education research: Applying social-ecological systems thinking and consilience to defining research goals. *Environmental Education Research*, 15(2), 189-198.
- Kruger, C., & Summers, M. (2000). Developing primary school children's understanding of energy waste. *Research in Science and Technological Education*, 18(1), 5-21.
- Kvale, S. (1996). *Interviews: An introduction to qualitative research interviewing*. London: Sage.

- Kyburz-Graber, R. (2004). Does case study methodology lack rigour? The need for quality criteria for sound case study research, as illustrated by a recent case in secondary and higher education. *Environmental Education Research*, 10(1), 53-65.
- Kyburz-Graber, R., & Robottom, I. (1999). The OECD-ENSI Project and its relevance for teacher training concepts in environmental education. *Environmental Education Research*, 5(3), 273-291.
- Kysilka, M. (1998). Understanding integrated curriculum. *The Curriculum Journal*, 9(2), 197-209.
- Ladwig, J., Mockler, N., & Ross, A. (2010). *Schools Climate Change Initiative [2007-2009] Evaluation* The University of Newcastle Australia.
- Ladwig, J., Ross, A., & Ellis, H. (2008). *Quality Teaching Evaluation of the Earthkeepers Program for Gibberagong Environmental Education Centre*: University of Newcastle.
- Lane, J., Wilke, R., Champeau, R., & Sivek, D. (1995). Strengths and weaknesses of teacher Environmental Education preparation in Wisconsin. *The Journal of Environmental Education*, 27(1), 36-45.
- Lang, J. (1999/2000). Tracing changes in teacher environmental education understanding. *Australian Journal of Environmental Education*, 15/16, 57-65.
- Larri, L. (2006). Comparative Assessment: Australian Sustainable Schools Initiative Pilot Programme in NSW and Victoria. Retrieved May 2009, from www.environment.gov.au/aussi
- Le Compte, M., & Goetz, J. (1982). Problems of reliability and validity in ethnographic research. *Review of Educational Research*, 52(1), 31-60.
- Lenzen, M., & Murray, J. (2001). The role of equity and lifestyles in education about climate change: Experiences from a large scale teacher development program. *Canadian Journal of Environmental Education*, 6, 32-50.
- Lin, N. (1976). *Foundations of Social Research*. NY: McGraw-Hill.
- Lindemann-Matthies, P., Constantinou, C., Junge, X., Kohler, K., Mayer, J., Nagel, U., et al. (2009). The integration of biodiversity education in the initial education of primary school teachers: Four comparative case studies from Europe. *Environmental Education Research*, 15(1), 17-37.
- Littledyke, M. (1997). Managerial style, the National Curriculum and teachers' culture: Responses to educational change in a primary school. *Educational Research*, 39(3), 234-262.
- Littledyke, M., Taylor, N., & Eames, C. (Eds.). (2009). *Education for Sustainability in the Primary Curriculum: A Guide for Teachers*: Palgrave MacMillan.
- Loughland, T. (2002). Young people's conceptions of environment: A phenomenographic analysis. *Environmental Education Research*, 8(2), 187-198.
- Loughland, T., Reid, A., Walker, K., & Petocz, P. (2003). Factors influencing young people's conceptions of environment. *Environmental Education Research*, 9(1), 3-20.
- Lucas, A. (1979). *Environment and environmental education: Conceptual issues and curriculum implications*. Melbourne: Australian International Press and Publications.
- Malone, K. (2007). The bubble-wrap generation: Children growing up in walled gardens. *Environmental Education Research*, 13(4), 513-528.
- Malone, K. (2008). *Every Experience Matters: An evidence based research report on the role of learning outside the classroom for children's whole development*

- from birth to eighteen years*: Report commissioned by Farming and Countryside Education for UK Department Children, School and Families. Wollongong. Australia.
- Martin, P. (2007). Caring for the environment: Challenges from notions of caring. *Australian Journal of Environmental Education*, 23, 57-64.
- Mastrilli, T. (2005). Environmental Education in Pennsylvania's Elementary Teacher Education Programs: A statewide report. *The Journal of Environmental Education*, 36, 22-30.
- Maxwell, T. W. (2009). Action research as a rich task? Unpublished
- Maxwell, T. W., Harrington, I., & Smith, H. (2007). Supporting primary and secondary beginning teachers online: Key findings of the Education Alumni Support Project. *Australian Journal of Education*.
- Maxwell, T. W., & Metcalfe, P. (1999/2000). Analysing environmental education curricula: The case of the IBO's Environmental Systems. *Australian Journal of Environmental Education*, 15/16, 77-84.
- Maykut, P., & Morehouse, R. (1994). *Beginning Qualitative Research, a Philosophic and Practical Guide*. London and Washington DC: The Farmer Press.
- McConnell, B. (2001). Teacher education in Environmental Education. *Australian Journal of Environmental Education*, 17, 35-39.
- McKeown-Ice, R. (2000). Environmental education in the United States: A survey of pre-service teacher education programs. *The Journal of Environmental Education*, 27(2), 33-39.
- McKeown, R. (2002). Education for Sustainable Development Toolkit. Retrieved December 2009, from <http://www.esdtoolkit.org>
- McKeown, R., & Hopkins, C. (2003). EE ≠ ESD. *Environmental Education Research*, 9(1), 117-128.
- McLeod, S. (2007). *Sustainability: A lost cause or one worth educating for?* Paper presented at the Paper presented at the UNESCO Workshop: Drivers and Barriers for Implementing Learning for Sustainable Development in Pre-School through Upper Secondary and Teacher Education, Goteberg.
- Meyers, R. (2006). Environmental learning: Reflections on practice, research and theory. *Environmental Education Research*, 12(3-4), 459-470.
- Miles, M., & Huberman, M. (1987). *Innovative methods for collecting and analyzing qualitative data: vignettes and pre-structured cases*. Paper presented at the annual meeting of the American Educational Research Association Washington DC April.
- Miles, M., & Huberman, M. (1994). *Qualitative Data Analysis* (2nd ed.). Beverly Hills: Sage.
- Miles, R., Harrison, L., & Cutter-Mackenzie, A. (2006). Teacher education: A diluted environmental education experience. *Australian Journal of Environmental Education*, 22(1), 49-60.
- Minichiello, V., Sullivan, G., Greenwood, K., & Axford, R. (1999). *Handbook for Research Methods in Health Sciences*. Sydney: Addison-Wesley.
- Moray House School of Education at the University of Edinburgh and Institute of Education at Manchester Metropolitan University. (2005). Educating for a Sustainable Future. Retrieved 9 March 2008, from <http://www.education.ed.ac.uk/esf/index.html>
- Moseley, C., Reinke, K., & Bookout, V. (2003). The effect of teaching outdoor environmental education on elementary preservice teachers' self-efficacy. *Journal of Elementary Science Education*, 15(1), 1-14.

- Munns, G., Lawson, J., O'Brien, M., & Johnson, K. (2006). *School Is For Me: Pathways to student engagement*: NSW Department of Education and Training, Sydney.
- Myers, O., Saunders, C., & Garrett, E. (2004). What do children think animals need? Developmental trends. *Environmental Education Research*, 10(4), 545-562.
- Nikel, J. (2007). Making sense of education 'responsibly': findings from a study of student teachers' understanding(s) of education, sustainable development and Education for Sustainable Development. *Environmental Education Research*, 13(5), 545-564.
- Nolet, V. (2007). Preparing sustainability literate teachers. *Teachers College Record*, 111(2), 409-442.
- Noone, G. (2006). *Teaching and place: A mutual relation*. Paper presented at the Sharing Wisdom for Our Future, Environmental Education in Action: 2006 Conference of the Australian Association of Environmental Education, Bunbury.
- NSW DECC, & NSW DET. (2006). Sustainable Schools NSW. Retrieved May 2009, from www.sustainableschools.nsw.edu.au
- NSW Department of Education. (1989). *Environmental Education Curriculum Statement*. Sydney.
- NSW DET. (2001a). *Environmental Education Policy for Schools*: New South Wales Department of Education and Training Curriculum Support Directorate.
- NSW DET. (2001b). *Implementing the Environmental Education Policy in Your School*: NSW Department of Education and Training Curriculum Support Directorate.
- NSW DET. (2003). *Quality Teaching in NSW Public Schools*. Sydney: NSW Department of Education and Training.
- NSW DET. (2006). *School is for me: Pathways to student engagement*: The Fair Go Project: A joint research initiative by the NSW DET and University of Western Sydney. Australia.
- NSW DET Curriculum Support Directorate. (2010). Climate Clever Energy Savers. Retrieved 26 March 2010, from http://www.curriculumsupport.education.nsw.gov.au/env_ed/programs/savers/ccesdetails.htm
- NSW Government and NSW Institute of Teachers. (2010). National Professional Standards for Teachers (Draft 12 February 2010, accessed April 2010). Retrieved from www.nswteachers.nsw.edu.au
- NSW Institute of Teachers. (2006a). Accreditation at Professional Accomplishment. Retrieved June 2009, from www.nswteachers.nsw.edu.au
- NSW Institute of Teachers. (2006b). Graduate Teacher Standards. Retrieved January 2009, from <http://www.nswteachers.nsw.edu.au/>
- NSW Institute of Teachers. (2007). Mandatory Requirements for Teacher Education Programs. Retrieved July 2008, from <http://www.nswteachers.nsw.edu.au/>
- Oulten, C., & Scott, B. (1995). The 'Environmentally Educated Teacher': An exploration of the implications of UNESCO-UNEP's ideas for pre-service teacher education programmes. *Environmental Education Research*, 1(2), 213-231.
- Pajares, M. (1992). Teachers' beliefs and educational research: Cleaning up a messy construct. *Review of Educational Research*, 62(3), 307-332.
- Palmer, J., Suggate, J., Robottom, I., & Hart, P. (1999). Significant life experiences and formative influences on the development of adults' environmental

- awareness in the UK, Australia and Canada. *Environmental Education Research*, 5(2), 181-200.
- Panizzon, D., Barnes, G., & Pegg, J. (2007). *Exceptional Outcomes in Science Education*. Teneriffe Qld: Post Pressed.
- Parlo, A., & Butler, M. (2007). Impediments to Environmental Education instruction in the classroom: A post-workshop inquiry. *International Journal of Environmental and Science Education*, 2(1), 32-37.
- Posch, P. (1999). The ecologisation of schools and its implications for educational policy. *Cambridge Journal of Education*, 29(3), 341-348.
- Powerhouse Museum. (2000). Ecological Footprint Calculator: Eco'tude. Retrieved 31 March 2010, from <http://www.powerhousemuseum.com/ecotude>
- Powers, A. (2004). Teacher preparation for Environmental Education: Faculty perspectives on the infusion of Environmental Education into pre-service methods courses. *The Journal of Environmental Education*, 35(3), 3-11.
- Queensland State Education. (2004). New Basics - The why, what, how and when of rich tasks. Retrieved 24 July 2009, from (<http://education.qld.gov.au/corporate/newbasics/pdfs/richtasksbklet.pdf>)
- Rauch, F. (2002). The potential of education for sustainable development for reform in schools. *Environmental Education Research*, 8(1), 43-52.
- Refshauge, A. (2004). Values in NSW Public Schools. A Ministerial Statement by the Minister for Education and Training and Minister for Aboriginal Affairs.: NSW DET.
- Reid, A., & Gough, S. (2000). Guidelines for reporting and evaluating qualitative research: What are the alternatives. *Environmental Education Research*, 6(1), 59-91.
- Reid, J. (2007). Literacy and environmental communications: Towards a 'pedagogy of responsibility'. *Australian Journal of Language and Literacy*, 30(2), 118-133.
- Richardson, V. (1996). The role of attitudes and beliefs in learning to teach. In J. Sikula, T. Buttery & E. Guyton (Eds.), *Handbook of Research on Teacher Education* (2nd ed., pp. 102-119).
- Rickinson, M. (2001). Learners and learning in environmental education: A critical review of the evidence. *Environmental Education Research*, 7(3), 207-320.
- Rickinson, M. (2006). Researching and understanding environmental learning: Hopes for the next ten years. *Environmental Education Research*, 12(3-4), 445-458.
- Robertson, C., & Krugly-Smolka, E. (1997). Gaps between advocated practices and teaching realities in environmental education. *Environmental Education Research*, 3(3), 311-327.
- Robottom, I. (1993). *Policy, Practice, Professional Development and Participatory Research: Supporting environmental initiatives in Australian schools*. Geelong: Deakin University.
- Robottom, I. (2004). Constructivism in environmental education: Beyond conceptual change theory. *Australian Journal of Environmental Education*, 20(2), 93-101.
- Robottom, I. (2007). *Some Conceptual Issues in Education for Sustainable Development*. Paper presented at the UNESCO Workshop: Drivers and Barriers for Implementing Learning for Sustainable Development in Pre-School through Upper Secondary and Teacher Education Goteberg.
- Robottom, I., & Hart, P. (1993). *Research in Environmental Education: Engaging the Debate*. Geelong: Deakin University Press.
- Sandelowski, M. (2003). Tables or tableaux: The challenges of writing and reading mixed methods studies. In A. Tashakkori & C. Teddlie (Eds.), *Handbook of*

- Mixed Methods in Social and Behavioral Research* (pp. 321-350). Calif: Sage Thousand Oaks.
- Sauve, L. (2005). Currents in environmental education: Mapping a complex and evolving pedagogical field. *Canadian Journal of Environmental Education, 10*, 11-37.
- Scott, B. (2007). *Raising standards: Making sense of the sustainable schools agenda*. London: Specialist Schools and Academies Trust.
- Scott, B., & Oulton, C. (1999). Environmental Education: Arguing the case for multiple approaches. *Educational Studies, 25*(1), 89-97.
- Sergiovanni, T., & Starratt, R. (1988). *Supervision: Human Perspectives* (4th ed.): McGraw-Hill.
- Serow, P. (2009). Education for Sustainability in primary mathematics education. In M. Littledyke, N. Taylor & C. Eames (Eds.). Melbourne: Palgrave Macmillan.
- Shallcross, T. (2008). Is a decade of teacher education for sustainable development essential for survival? *Journal of Education for Teaching, 33*(2), 137-147.
- Shepardson, D., & Harbor, J. (2004). ENVISION: The effectiveness of a dual-level professional development model for changing teacher practice. *Environmental Education Research, 10*(4), 471-492.
- Shepardson, D., Niyogi, D., Choy, S., & Umarporn, C. (2009). Seventh grade students' conceptions of global warming and climate change. *Environmental Education Research, 15*(5), 549-570.
- Simmons, D. (1998). Using natural settings for environmental education: Perceived benefits and barriers. *Journal of Environmental Education, 29*(3), 23-31.
- Skamp, K. (1999). *Environmental concepts: Important and neglected*. Paper presented at the Australian Association of Environmental Education Conference Sydney.
- Skamp, K. (2009). Understanding teachers' 'levels of use' of learnscapes. *Environmental Education Research, 15*(1), 93-110.
- Skamp, K., & Bergmann, I. (2001). Facilitating Learnscape development, maintenance and use: Teachers' perceptions and self-reported practices. *Environmental Education Research, 7*(4), 333-357.
- Skamp, K., Boyes, E., & Stanisstreet, M. (2009). Global warming responses at the Primary Secondary interface: 2. Potential effectiveness of education. *Australian Journal of Environmental Education, 25*, 31-44.
- Smith, G. (2002). Place-based education: Learning to be where we are. *Phi Delta Kappan* (April).
- Smith, G. (2007). Place-based education: Breaking through the constraining regularities of public school. *Environmental Education Research, 13*(2), 189-208.
- Smith, S., & Cupitt, J. (2007). *Education for Sustainable Development and pedagogical approaches in Australian Schools: Conflicts with administrative and social values*. Paper presented at the Fourth International Conference on Environmental Education (ICEE), Centre for Environment Education, Ahmedabd, India.
- Smythe, R., & Maxwell, T. (2008). *The Research Matrix: An approach to Supervision of Higher Degree Research*. Melbourne: HERDSA.
- Sobel, D. (1996). *Beyond Ecophobia: Reclaiming the Heart in Nature Education*. Great Barrington, MA: The Orion Society and the Myrin Institute.
- Sommer, R., & Sommer, B. (1980). *A Practical Guide to Behavioral Research: Tools and Techniques*: Oxford Univ Press Inc.

- Stake, R. (2005). Qualitative Case Studies. In N. Denzin & Y. Lincoln. (Eds.), *Qualitative Research* (3rd ed., pp. 443-466).
- Steele, F. (2010). *Mainstreaming Education for Sustainability in Pre-service Teacher Education: Enablers and constraints: A report prepared by ARIES for the Australian Government Department of Environment Water Heritage and the Arts.*
- Stevenson, R. (1987). Schooling and environmental education: contradictions in purpose and practice. *reprinted in Environmental Education Research, 2007, 13(2), 139-153.*
- Stevenson, R. (2004). Constructing knowledge of educational practices from case studies. *Environmental Education Research, 10(1), 39-51.*
- Stevenson, R. (2007). Schooling and environmental/sustainability education: From discourses of policy and practice to discourses of professional learning. *Environmental Education Research, 13(2), 265-285.*
- Stewart, A. (2006). Seeing the trees and the forest: Attending to Australian natural history as if it mattered. *Australian Journal of Environmental Education, 22(2), 85-98.*
- Summers, M., Corney, G., & Childs, A. (2003). Teaching sustainable development in primary schools: An empirical study. *Environmental Education Research, 9(3), 327-346.*
- Summers, M., Corney, G., & Childs, A. (2004). Student teachers' conceptions of sustainable development: The starting points of geographers and scientists. *Educational Research, 46(2), 164-183.*
- Summers, M., Corney, G., & Childs, A. (2005). Education for sustainable development in initial teacher training: Issues for interdisciplinary collaboration. *Environmental Education Research, 11(5), 623-647.*
- Summers, M., Kruger, C., Childs, A., & Mant, J. (2000). Primary school teachers' understanding of environmental issues: An interview study. *Environmental Education Research, 6(4).*
- Taylor, N., & Kennelly, J. (2007). Getting the point about 'Western' consumption patterns: Some student responses to a cartoon about ecological footprint. *Geographical Education, 20, 58-62.*
- Taylor, N., Kennelly, J., Jenkins, K., & Callingham, R. (2006). The impact of an education for sustainability unit on the knowledge and attitudes of pre-service primary teachers at an Australian university. *Geographical Education, 19, 46-59.*
- Taylor, N., Nathan, S., & Coll, R. (2003). Education for sustainability in regional NSW, Australia: An exploratory study of some teachers' perceptions. *International Research into Geographical and Environmental Education, 12(4), 289-309.*
- Teddlie, C., & Tashakkori, A. (2003). Major issues and controversies in the use of mixed methods in the social and behavioral sciences. In A. Tashakkori & C. Teddlie (Eds.), *Handbook of Mixed Methods in Social and Behavioral Research* (pp. 3-50). Calif: Sage Thousand Oaks.
- Tilbury, D. (1992). Environmental education within pre-service teacher education: The priority of priorities. *International Journal of Environmental Education and Information, 11(4), 267-280.*
- Tilbury, D. (1995). Environmental education for sustainability: Defining the new focus of environmental education in the 1990s. *Environmental Education Research, 1(2), 195-212.*

- Tilbury, D. (2001). Sustaining innovation in education: Experiences in the Learning for a Sustainable Environment Project. *Australian Journal of Environmental Education*, 17, 87-93.
- Tilbury, D. (2004). Rising to the challenge: Education for sustainability in Australia. *Australian Journal of Environmental Education*, 20(2), 103-114.
- Tilbury, D., Coleman, V., & Garlick, D. (2005). *A National Review of Environmental Education and its Contribution to Sustainability in Australia: School Education*. Canberra: Australian Government Department of Environment and Heritage and Australian Institute in Education for Sustainability (ARIES).
- Tilbury, D., & Cooke, K. (2005). *A National Review of Environmental Education and its Contribution to Sustainability in Australia: Frameworks for Sustainability - Key Findings* (Vol. 1). Canberra: Australian Department of Environment and Heritage, Australian Research Institute in Education for Sustainability (ARIES).
- Tilbury, D., & Wortman, D. (2005). Whole school approaches to sustainability. *Geographical Education*, 18, 22-30.
- Tschannen-Moran, M., & Hoy, A. (2001). Teacher efficacy: Capturing an elusive construct. *Teaching and Teacher Education*, 17, 783-805.
- UNESCO. (1978). *Intergovernmental conference on environmental education: Tbilisi (USSR), 14-26 October 1977. Final Report*. Paris: UNESCO.
- UNESCO. (2002). Teaching and Learning for a Sustainable Future: A multi-media teacher education programme. Retrieved 8 March 2008, from <http://www.unesco.org/education/tlsf>
- UNESCO. (2004). United Nations Decade of Education for Sustainable Development 2005-2014. Retrieved March 2007, from http://portal.unesco.org/education/en/ev.php-URL_ID=27234&URL_DO=DO_TOPIC&URL_SECTION=201.html
- UNESCO. (2005). *Guidelines and recommendations for reorienting teacher education to address sustainability*. Paris: UNESCO.
- Uzzell, D. (1999). Education for environmental action in the community: New roles and relationships. *Cambridge Journal of Education*, 29(3), 397-413.
- Uzzell, D., Rutland, A., & Whistance, D. (1995). Questioning Values in Environmental Education. In Y. Guerrier, N. Alexander, J. Chase & M. O'Brien (Eds.), *Values and Environment: A Social Science Perspective*: John Wiley & Sons Ltd.
- Van Maanen, J. (1999). Case studies: Why now more than ever, cases are important. In A. Chen & J. Van Maanen (Eds.), *The Reflective Spin* (pp. 25-44). Singapore: World Scientific.
- van Matre, S. (1990). *Earth Education: A New Beginning*. Warrenville IL: The Institute for Earth Education.
- Vare, P., & Scott, B. (2007). Learning for a change: Exploring the relationship between education and sustainable development. *Journal of Education for Sustainable Development*, 1(2), 191-198.
- Varga, A., Koszo, M., Mayer, M., & Sleurs, W. (2007). Developing teacher competences for education for sustainable development through reflection: The Environment and School Initiatives Approach. *Journal of Education for Teaching*, 33(2), 241-256.
- Walker, K. (1995). The teaching and learning of environmental education in NSW Primary Schools: A case study. *Australian Journal of Environmental Education*, 11, 121-129.

- Walker, K. (1997a). Challenging critical theory in environmental education. *Environmental Education Research*, 3(2), 155-163.
- Walker, K. (1997b). Environmental education and the school curriculum: Need for coherent curriculum theory. *International Research in Geographical and Environmental Education*, 6(3), 252-255.
- Walker, K., Loughland, T., & Brady, L. (2000). *A Benchmark Survey of the Environmental Knowledge, Values and Attitudes of NSW School Students: 2000*. Sydney: UTS.
- Wallace, J., Sheffield, R., Rennie, L., & Venville, G. (2007). Looking back, looking forward: Re-searching the conditions for curriculum integration in the middle years. *The Australian Educational Researcher*, 34(2), 29-49.
- Wals, A. (2010). Between knowing what is right and knowing what is wrong to tell others what is right: On relativism, uncertainty and democracy in environmental and sustainability education. *Environmental Education Research*, 16(1), 143-151.
- Wals, A., & Alblas, A. (1997). School-based Research and Development of Environmental Education: a Case Study. *Environmental Education Research*, 3(3), 253-268.
- Wang, J., Odell, S., & Schwille, S. (2008). Effects of teacher induction on beginning teachers' teaching: A critical review of the literature. *Journal of Teacher Education*, 59(2).
- WCED. (1987). Report of the World Commission on Environment and Development: Our Common Future. Retrieved July 2008, from www.un-documents.net/wced-ocf.htm
- Whitehouse, H. (2001). 'Not Greenies' at school: Investigating the discourses of environmental activism in regional Australia. *Australian Journal of Environmental Education*, 17, 71-76.
- Whitehouse, H. (2008). "EE in cyberspace, why not?" Teaching, learning and researching tertiary pre-service and in-service teacher environmental education online. *Australian Journal of Education*, 24, 11-22.
- Wideen, M., Mayer-Smith, J., & Moon, B. (1998). A critical analysis of the research on learning to teach: Making the case for an ecological perspective on inquiry. *Review of Educational Research*, 68(2), 130-178.
- Wilson-Hill, F., Law, B., & Eames, C. (2008). *Action competence in New Zealand schools: Improving the capacity for student learning in Efs*. Paper presented at the 15th Biennial Australian Association for Environmental Education Conference July 2008, Charles Darwin University, NT.
- Windle, J. (2009). The limits of school choice: some implications for accountability of selective practices and positional competition in Australian education. *Critical Studies in Education*, 50(3), 231-246.
- Winther, A., Volk, T., & Schrock, S. (2002). Teacher decision making in the first year of implementing an issues-based environmental education program: A qualitative study. *The Journal of Environmental Education*, 23(3), 27-33.
- Woolfolk Hoy, A. (2000). *Changes in teacher efficacy during the early years of teaching*. Paper presented at the annual meeting of the American Educational Research Association, New Orleans.
- Yavetz, B., Goldman, D., & Pe'er, S. (2009). Environmental literacy of pre-service teachers in Israel: A comparison between students at the onset and end of their studies. *Environmental Education Research*, 15(4), 393-415.

- Yencken, D., & Fien, J. (2000). Songlines and the Gondwanan Inheritance. In D. Yencken, J. Fien & H. Sykes (Eds.), *Environment, Education and Society in the Asia-Pacific: Local Traditions and Global Discourses* (pp. 140-162). London: Routledge.
- Yencken, D., Fien, J., & Sykes, H. (Eds.). (2000). *Environment, Education and Society in the Asia-Pacific: Local Traditions and Global Discourses*: Routledge.
- Yin, R. K. (2003). *Case Study Research: Design and Methods* (3rd ed.): Thousand Oaks: Sage Publications.
- Zachariou, A., & Kadji-Beltran, C. (2009). Cypriot primary school principals' understanding of education for sustainable development key terms and their opinions about factors affecting its implementation. *Environmental Education Research, 15*(3), 315-342.
- Zak, K., & Munson, B. (2008). An exploratory study of elementary teachers' understanding of ecology using concept maps. *The Journal of Environmental Education, 39*(3), 32-47.
- Zelezney, L. (1999). Educational interventions that improve environmental behaviours. *Journal of Environmental Education, 31*(1), 5-14.
- Zemits, B. (2006). Biodiversity: Who knows, who cares? *Australian Journal of Environmental Education, 22*(2), 99-107.

Appendices

- Appendix 2.1 Documentation shaping EfS in Australia and in NSW in particular
- Appendix 2.2 NSW examples of curriculum integration
- Appendix 2.3 NSW School Environment Management Plan process
- Appendix 2.4 Jensen's (2002) model of teaching for 'action competence'
- Appendix 2.5 Learnscaping
- Appendix 2.6 Support for Education for Sustainability in NSW
- Appendix 3.1 Survey A and Survey B
- Appendix 3.2 Interview schedules (Phase One)
- Appendix 3.3 Instruments (Phase Two)
- Appendix 3.4 Ethics Approval (correct term)
- Appendix 4.1 EDSE 412: Aims
- Appendix 4.2 EDSE 412: Content
- Appendix 4.3 Policy Objectives (national and NSW)
- Appendix 4.4 Questions used in values analysis
- Appendix 5.1 Tabulated results from Survey A (T1) and Survey B (T2)
- Appendix 11.1 Case summaries
- Appendix 11.2 Beginning teacher actions

Appendix 2.1 Documentation shaping EfS in Australia and in NSW in particular

As a part of its response to *The Adelaide Declaration on National Goals for Schooling in the Twenty-first Century* (Department of Education Science and Training, 2004); the UN *Report of the World Summit on Sustainable Development*, Johannesburg, South Africa, 26 August - 4 September 2002 (UNESCO, 2004a); and the United Nations Decade of Education for Sustainable Development 2005-2014 (UNESCO, 2004b), the Australian Government disseminated to all schools *Educating for a Sustainable Future: A National Environmental Education Statement for Australian Schools* (ADEH, 2005). Use of this latter document is not mandatory but it is intended to encourage and direct the nature of EfS in schools and in teacher education. Whilst ‘environmental education’ is the term used in the title of this document, the term ‘environmental education for sustainability’ is used within. This document describes a mode of education that is compatible with EfS as defined (Tilbury, 1995). Moreover the *National Statement* (ADEH, 2005) describes a style of education compatible with Robottom and Hart’s (1993) conception of a socially critical approach in the sense that it advocates collaborative inquiry into local issues, citizenship, and values a school management process that exemplifies more sustainable practices. In this *Statement* it is claimed that education should take account of the interdependence of social, political, economic and ecological systems, and of the way in which sustainability of these systems is dependent upon principles of peace, equality, human rights, conservation and democracy, all of which should be embedded in EfS and the practices of the school. There is clear direction that curriculum should include sustainability concepts such as intergenerational equity, interspecies equity, carrying capacity, ecological footprint, the precautionary principle and natural resource accounting (ADEH, 2005).

Whilst the inclusion of environmental education in the school curriculum is not compulsory in most Australian states, the NSW Government has mandated use of the *Environmental Education Policy for Schools* (NSW DET, 2001a). This policy is relevant to the majority of schools in NSW, meaning those which are managed by a central education system, the Department of Education and Training (DET). At present the syllabus for each Key Learning Area (KLA) to be taught in those schools

is prepared by a separate state body, the Board of Studies. However DET policy implementation must cohere with the intentions of the Board of Studies syllabuses.

The NSW DET *Policy* (2001a) builds upon an earlier *Environmental Education Curriculum Statement K-12* (NSW Department of Education, 1989), which was broadly situated within the conceptualisation of EE as defined above. In contrast to the *Curriculum Statement* (1989), the NSW DET *Policy* (2001a) refers to the notion of sustainability of futures and draws upon the principles of *Agenda 21* (United Nations Conference on Environment and Development, 1992). This policy is about the need for ‘balance between the environmental, social and economic impacts of development’ (NSW DET, 2001a:7). Despite its title, the NSW *Policy* fits within the conceptualisation of EfS provided earlier. This concurrence is indicated through its objectives. Objectives for the *Policy* are those for curriculum, management of resources and management of grounds. Schools should manage resources and grounds in a sustainable way and to ‘identify learning opportunities for students resulting from practices in the management of resources’ and school grounds (NSW DET, 2001a:11). In this way implementation of the *Policy* focuses on issues of relevance to the learner, namely those within the school community, and is issues based. Further objectives state that students should develop skills in ‘identifying’, ‘assessing’ and ‘resolving environmental problems’, and ‘skills in communicating environmental problems to others’, implying that EfS would have a critical and action orientation and be a collective effort. The *Policy* and its partner document *Implementing the Environmental Education Policy in Your School* (NSW DET, 2001b), encourage schools to engage students collectively in the processes of examining the value positions associated with society, economy and environment and to be active in building local environmental knowledge, planning and bringing about change in favour of sustainability. Furthermore this policy includes a description of environmental education as allowing a ‘sensitised approach’, ‘appreciation’, and feeling ‘at one with the environment’ (NSW DET, 2001a:8).

The more recent, post-Johannesburg Summit, Australian *National Statement* (ADEH, 2005), when compared with the NSW DET *Policy* (2001a), gives greater emphasis to the notion of sustainability into the future. In particular the *National Statement* gives greater attention to environmental citizenship; knowledge as problematic, the future as

uncertain and consequently the need for application of the precautionary principle; and consideration of the social, cultural, economic and ecological consequences of various courses of action.

Through descriptions and suggested strategies, the *National Statement* also provides a vision of the pedagogy of EfS. The suggested strategies require teachers to give responsibility for learning to students and emphasise the role of real world investigations and actions. Whilst the NSW DET *Policy*, in its partner document *Implementing the Environmental Education Policy in Your School* (NSW DET, 2001b) similarly provides details of teaching strategies, the *National Statement* provides a stronger focus on the role of the student as an autonomous learner and the teacher as a facilitator of student effort towards formulating and constructing a sustainable future (ADEH, 2005).

In Australia at present, the national government also influences school education through funding initiatives. As an example, the national government have funded Community Water grants and are currently funding the National Solar in Schools Program. Under this program every school in Australia is entitled to \$50,000 for purchases of technologies that reduce greenhouse gas emissions and water use. In these ways the national government has provided tangible support, to complement the policy initiatives for EfS in schools.

However, at present each state government is responsible for curriculum, staffing, provision of most assets and governance through various policies, for schools within its boundaries, but with some national support. It is for this reason that the state of NSW has its own environmental education policy. A National Curriculum is to be introduced in Australia in coming years and will replace state-based curricula.

The historical antecedents of EfS in Australia and in particular in NSW, meaning its origins in the environmental education movement of the 1960s, 1970s and 1980s, are still visible in official documentation linked with EfS and current today. For example, specific reference to the everyday conception of education in, about and for the environment is made in the NSW DET *Policy* (2001a) and the *National Statement* (ADEH, 2005). Particular aspects of contemporary EfS, derived from those origins,

have been a part of practice for many years in NSW and remain as a significant component of school environment related activity, and purportedly of the conceptualisation of teachers in schools. However, both internationally and in Australia, there has been a shift over time in emphasis, as described, towards equipping communities for bringing about change towards a more sustainable future.

There are two more recent Australian national documents: *Living Sustainably: The Australian Government's National Action Plan for Education for Sustainability* (AGDEWHA, 2009); and *Education for Sustainability: The role of education in engaging and equipping people for change* (ARIES, 2009). These draw upon a number of sources in particular the *UN Decade of Education for Sustainable Development* (UNESCO, 2003). The *National Action Plan* (AGDEWHA, 2009) provides sustainability goals and education strategies across all sectors of the community. Most relevant to this study is the fact that the *Plan* (AGDEWHA, 2009) endorses the *National Environmental Education Statement for Australian Schools* (ADEH, 2005).

Education for Sustainability: The role of education in engaging and equipping people for change (ARIES, 2009:3) appears to have the purpose of promulgating a particular definition of EfS which both documents share. Whilst maintaining a socially critical approach, the focus is on envisioning the future, critical thinking that 'challenges us to examine and question the underlying assumptions that shape our world', systemic thinking and participation in a process of equipping people for change with sustainability in mind. Although mention is made of the biophysical environment in the sense of 'conserving biodiversity and ecological integrity' and 'ensuring no net loss of human or natural capital' (AGDEWHA, 2009:7), the notion of the natural environment as having intrinsic value appears to be lost, and experiences for students in the environment do not appear amongst the 'principles of EfS' in this document (ARIES, 2009:3). Nature is viewed as 'natural capital' which is useful in so far as it forces recognition of the role of environment in supporting our national wealth. However there is an implication that our national wealth is what is really important with 'nature' deemed to be one amongst our national stock of economic resources, empty of its other values. In this the ARIES (2009) document differs from the earlier

National Statement (ADEH, 2005) which makes specific reference to principles such as interspecies equity.

A position on EfS is also held by Australia's professional organisation for environmental educators (The Australian Association for Environmental Education (AAEE)) and elaborated in their statement, *AAEE Position on the National Curriculum* (AAEE, 2009). They explicitly use the term EfS in this position statement, written as a submission in preparation for the National Curriculum (Australian Curriculum Reporting and Assessment Authority, 2009). Their approach falls within Tilbury's (1995) definition of socially critical environmental education:

As a transformative education, education for sustainability needs to challenge current mindsets about our world and be oriented to developing action competence that enables all to contribute to a sustainable, safe, healthy, prosperous and more equitable world. It needs to stimulate critical reflection and innovation so new concepts can be explored and new methods and tools can be developed (AAEE, 2009:1).

Essentially the AAEE statement of EfS includes the notions of: environmental and human interdependence; the intrinsic value of nature and the need to protect it; students being active and caring citizens in building sustainability; critical thinking about the relation of society to environment; development of a strong sense of place and connection to the natural world; and valuing of cooperation, equality and the environment.

Their statement is about equipping people for change towards environmental, social and economic sustainability as in the *National Action Plan for Education for Sustainability* (AGDEWHA, 2009) and the ARIES (2009) statement. However in contrast to the position of the latter Australian national documents, the AAEE statement is inclusive of knowledge about nature, and the intrinsic value of nature, as well as equipping people for change towards sustainability:

This [EfS] must include the development of a strong ecological identity through a sense of place and real connections to the natural world. Similarly, a love of nature is paramount in developing a commitment to sustaining environments (AAEE, 2009:1).

In taking this stand, the AAEE statement is consistent with the *National Statement* (ADEH, 2005) and the *NSW Policy* (NSW DET 2001a).

Appendix 2.2: Curriculum integration applied to the NSW curriculum

Integrated curriculum can be understood as a continuum of teaching approaches (Kysilka, 1998). An integrated curriculum could mean, for example, that a single theme is taught through separate disciplines where the integrity of the disciplines is retained (Kysilka, 1998). This corresponds with points (a) and (b) below from the *NSW Policy on Environmental Education* (2001a:12) which uses the terms ‘multi-disciplinary’ and ‘across-discipline’. The *Policy* directs teachers to: (a) ‘identify and address those outcomes which are specific to environmental education in syllabuses K-12’; (b) ‘integrate the teaching of environmental education topics and issues to support outcomes in other syllabuses’; and (c) to ‘use the opportunities provided by special events and school community actions to enhance those student learning outcomes related to environmental education’ (NSW DET, 2001a:12).

In NSW the social science syllabus in particular stipulates clear outcomes relevant to EfS and is therefore congruent with (a). As an example, at Stage 2, students should describe people’s interactions with environments and identify responsible ways of interacting with environments. This requires students to explore ways in which the environment supports human activity, as well as evaluate human activity in terms of environmental impact.

Point (b) is here interpreted to mean that teachers should use environment-related content in their pursuit of outcomes in Key Learning Areas such as English and mathematics in which outcomes specific to environmental education do not directly occur. It has been shown that EfS integration into English can be far more sophisticated than using environment-related content (see for example the *Australian Journal of Language and Literacy* (Special Edition), 2007, Vol 30, Issue 2) and can in fact competently accomplish a ‘pedagogy of responsibility’ (Reid, 2007:118) towards our shared environment. Point (c) suggests that a more holistic approach could be taken and is an essential element of a whole school approach to sustainability.

Appendix 2.3: Process of preparation of the School Environmental Management Plan

The SEMP process involves many characteristics of socially critical environmental education, as described by Robottom and Hart (1993:24), in that it is based on real problems; requires the clarification of values; makes use of both ecological and across-discipline skills and concepts; questions current practice; is action oriented; encourages the development of a sustainable environment; and involves students and others working collaboratively in groups.

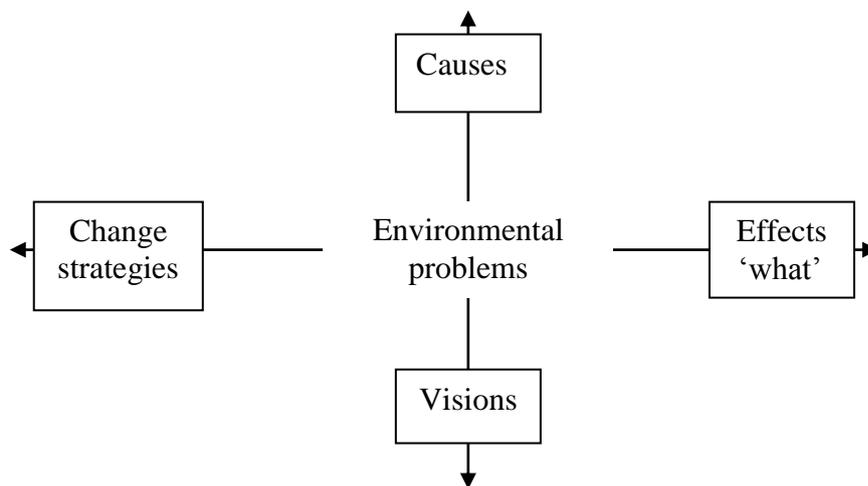
Steps to developing a School Environmental Management Plan

(SEMP) (NSW DET, 2001b:22)

- Step 1. Set up your school environment management committee**
Form an environmental management committee comprising representatives from the school's administration, teachers, students, canteen staff, general assistants, cleaners and parents. (*collaborative*)
- Step 2. Determine your environmental objectives** (eg adopt sustainable management practices)
- Step 3. Form a subcommittee for each of the following areas:**
- Curriculum
 - Management of resources, and
 - Management of school grounds
- The subcommittees conduct an environmental audit and prepare a draft action plan (*investigative and active*)
- Step 4. The subcommittees** submit their action plans to the school environmental management committee.
- Step 5. The school environmental management committee** prioritises and integrates the action plans into one school environmental management plan for the whole school.
- Step 6. The committee implements the school environmental management plan**
- Step 7. The committee evaluates the plan** against the *Steps in becoming an environmentally active school* (see page 13 of the NSW *Environmental Education Policy for Schools*)

Appendix 2.4: Jensen’s model of action competence is useful for teachers who wish to build an ‘action component’ into EfS.

Jensen’s (2002) ‘action competence’ model of environmental education, presented below has four points of focus, each described as a type of knowledge. Jensen (2002), along with Fien (2000), argued that traditionally environmental education has concerned itself largely with the effects of environmental problems such as pollution, or biodiversity loss but needed to have a socially critical edge. Jensen (2002) maintained that students must investigate the causes of any given problem and should have the opportunity to express their vision of how they would wish the situation to be.



Jensen’s model of teaching for ‘action competence’: Jensen’s model shows the four areas that teaching needs to address to achieve ‘action competence’ (Jensen, 2002:330).

Additionally students need knowledge of the kinds of actions that they can take in order to bring about the changes they desire. These actions can be described as direct, for example, establishing a compost system; indirect, for example, making requests to local council; individual, such as reducing personal carbon emissions; or collective, as in participating in biodiversity rehabilitation. In this way Jensen (2002) defined ‘action’ for students in a manner that could be accommodated in everyday school work.

In this conceptualisation of EfS, the role of science, mathematics, English and the social sciences can be seen as essential in contributing to the exploration of the issue and associated cultural values. Additionally, the role of creative arts can be seen as a medium of expression in the establishment of a vision. Finally, the role of all Key Learning Areas is implicated in the action component of EfS teaching and learning. Thus Jensen (2002) has reformulated the notion of action in a way that can feasibly be achieved within the school setting.

Appendix 2.5: Specific modes of experiential learning in implementing EfS: action through learnscaping and critical pedagogy of place

Action through learnscaping

‘Learnscapes’ is a learning program within which groups of people redesign and rehabilitate a place, with an emphasis on ecological sustainability. The focus of Learnscapes is on the processes of design and construction as well as on the ultimate product of this activity. It is a program which, in schools, relates to learning outcomes of the school curriculum (NSW DET, 2001a).

The learnscape created in the school yard encourages authentic engagement with environment. The value of the learnscape is that students are involved in the design and construction of the learnscape and understand its wider purpose, for example, its role in maintaining biodiversity and ecological integrity. Learnscaping activities can potentially build the skills, as well as the realisation of the possibility for, environmental repair and change.

The processes of creating and maintaining a learnscape provide students with opportunity to develop action skills in the environment in a holistic, curriculum integrated way, thus offering a solution to the notion that ‘action’ is too difficult in school settings. These ideas have been further developed by Skamp (2009).

Critical pedagogy of place

In a theory of critical pedagogy of place, Gruenewald (2003) argued that students develop empathy for place through their learning experiences in a place. Smith (2002) identified the essential elements of place-based approaches, and these are of interest because of their congruence with whole school approaches to EfS, as an expression of how EfS can be conceptualised, and of how an environmental ethic can be developed.

In place-based approaches:

- teachers and students focus on real phenomena in their environment;
- there is an emphasis on experiences that allow students to become creators of knowledge rather than consumers of knowledge;
- students’ questions and concerns play a significant role in what is studied;

- teachers act as experienced guides, co-learners and organisers of school and community resources for learning; and
- there is community involvement in student learning and student involvement in community learning (Smith, 2002).

Appendix 2.6: Support for Education for Sustainability in NSW

Support for whole school EfS in NSW including the Sustainable Schools Project

The whole school approach has been supported in NSW through several specially funded projects that have served to interpret socially critical EfS in a practical manner. One such initiative was the Sustainable Schools Program (SSP) conducted in NSW from 2003 to 2005 under the umbrella of the AuSSI (AGDEWHA, 2007). In this program, clusters of ten participating schools received the assistance of an external facilitator who provided guidance in professional learning surrounding the whole school approach, in planning, hands on auditing tasks, writing SEMP, establishing local networks and so on (Larri, 2006). This was the first state wide project aimed at facilitating a socially critical style of EfS in line with the NSW DET *Policy* (2001a). Findings of the evaluation of the Program (Funnell & Larri, 2005) have also been used by NSW DET to shape further funded projects of EfS policy implementation. In these later projects, greater attention has been given to the role of teacher professional learning in curriculum integration aspects of the policy (see for example the Schools Climate Change Initiative and Climate Clever Energy Savers, NSW DECC & DET, 2005).

As a part of NSW DET *Policy* (2001a) implementation, preparation of school SEMP has continued to be well supported by the NSW Government Sustainable Schools Project (NSW DECC & NSW DET, 2006). The Sustainable Schools Project provides a web interactive SEMP builder, excellent teaching resources and examples of how case study schools have approached EfS (NSW DECC & NSW DET, 2006). Establishment of the website was accompanied in 2008-2009 by a professional learning program which assisted representatives from volunteer schools to understand and use the website. Although numbers of schools preparing SEMP has been proportionally low, it is evident from school registrations on the website that participation greatly increased during 2009. In August of 2009, of the total of 3200 schools in NSW, 24% had a SEMP (NSW DECC, 2009). However this figure conceals the fact that an unknown proportion of that 24% of SEMP was incomplete and an unknown proportion was in fact a 'SEMP-in-action'. The record of schools registered also conceals numbers of schools that in fact have a SEMP but have not registered with Sustainable Schools. Obviously the SEMP registration figures are a

very imperfect measure of policy implementation and a figure of 24% uptake by schools of a key tool of policy implementation over a period of 8 years does not appear as a particularly robust response. None-the-less, there are examples of individual schools who have competently implemented a SEMP, successfully reducing energy, water and materials use and integrating these actions into curriculum. Examples of these can be found on the Sustainable Schools website (NSW DECC & NSW DET, 2006).

Environmental Education Centres (EEC)

Environmental Education Centres in NSW began as Field Studies Centres (FSC) in the 1970s and have been established in many locations throughout the state. The FSCs catered for classes of school students who visited from their surrounding region. Although they varied greatly in the learning programs offered to visiting schools, Field Studies Centres primarily offered outdoor interpretation of the natural or built environment. It could be construed that at that time environmental education would be interpreted by many as being connected with outdoor education and as a part of science education. The work of the Field Studies Centres was complemented by a supporting document, the *Environmental Education Curriculum Statement* (NSW Department of Education, 1989).

Over time the interpretation of environmental education adopted by the Environmental Education Centres (EEC, formerly FSC) changed in response to the release of the *Environmental Education Policy for Schools* (NSW DET, 2001a) and concomitant evolving interpretations of what needed to be done and how schools' needs could best be met. The change in interpretation of the task at hand was a change towards EfS. This meant that the EEC role expanded to implementing the *Policy* through, for example, assisting schools to identify more sustainable practices associated with whole school management and development of learnscapes, in addition to the more traditional FSC role of helping students to interpret and appreciate the natural environment. The EECs became responsible for assisting schools to implement environment management plans, to engage active student environment groups, and increasingly undertook greater responsibility for provision of professional learning for teachers in the area of curriculum.

Special Forever

‘Special Forever’ is the name of a student writing project which is made available to all primary students whose schools are located in the Murray-Darling River Catchment. Case study reports of classes and teachers involved in Special Forever demonstrate how students can learn to be critical through coming to know a place, and how that place is ‘constructed’ as a consequence of human interaction with landscape (Comber, Reid & Nixon, 2007). The case study reports also provide an example of integrated curriculum across the KLAs and show how action can be integrated into the curriculum at the level of classroom organisation.

Comber, Reid and Nixon (2007:15), in describing the reported work of teachers in this project, adopt the term ‘pedagogy of responsibility’. This term ‘refers to a dynamic relationship between scientific inquiry and action, and implies a sense of political action and advocacy’. Within the ‘pedagogy of responsibility’, students learn to value a ‘diversity and “otherness” that includes the natural world and its non-human inhabitants’ (Comber, Reid and Nixon, (2007:15).

Appendix 3.1 Phase one instruments: Survey A and Survey B

Note: Following is a copy of the surveys used with the cohort enrolled in EDSE 412.

Appendix 3.1 A Survey A: February 2007 (T1)

Education for sustainability is a comparatively new field of education and much has yet to be learnt about how best to support teachers implementing policies in this area.

This survey is part of a study that aims to find improved ways of preparing beginning teachers in the area of education for sustainability.

This is not a test and there are no right or wrong answers. We have asked for your name but you do not have to provide it. However if you do provide your name it will enable us to better understand how different experiences affect your views. You do not have to participate in this survey if you do not wish to.

Your responses to this survey will in no way affect your assessment for EDSE 412. They will remain confidential, to be seen only by the research team.

Your contribution to this research is greatly valued. Thank you.

Please provide the following information:

Age: 20-25 25-30 other

Gender: M F

Name: _____

Group number: _____

1. Rate your desire to include education for sustainability in your teaching.

Please tick one of the lines only.

- very strong
- strong
- medium
- weak
- very weak

2. Why do you think you feel this way?

3. How confident are you about including education for sustainability in your teaching? Rate your confidence

- very confident
- confident
- medium
- not very confident
- not confident at all

4. In your view what is it that gives you this confidence or lack of confidence?

5. How would you rate your skills and knowledge to bring about environmental improvements even if it is only in a small way? (Please tick one of the lines only).

- very high
- high
- medium
- low
- very low

6. In your view, what will the Australian environment be like in the future?

In the future I think the Australian environment will be:

Much better	Better	Same	Worse	Much worse

7. Choose the best answer by placing a tick in the box:

	Strongly Agree	Agree	Disagree	Strongly disagree
I can help the environment				
I think my friends care about the environment				
Teachers can play an important role in solving environmental problems through teaching.				

8. How important are environmental problems to you?

Very important	Important	Not important

Thank you

Appendix 3.1 B

Survey B: June 2007 (T2)

1. Rate your desire to include education for sustainability in your teaching.

Please circle one of the options only.

- very strong
- strong
- medium
- weak
- very weak

2. Why do you think you feel this way?

3. How confident are you about including education for sustainability in your teaching? Rate your confidence. Please circle one option.

- very confident
- confident
- medium
- not very confident
- not confident at all

4. In your view what is it that gives you this confidence or lack of confidence?

5. How would you rate your skills and knowledge to bring about environmental improvements even if it is only in a small way?

(Please circle **one** of the options only).

- very high
- high
- medium
- low
- very low
-

6. In your view, what will the Australian environment be like in the future?

In the future I think the Australian environment will be:

(Please circle one option)

Much better	Better	Same	Worse	Much worse
-------------	--------	------	-------	------------

7. Choose the best answer by placing a tick in the box:

	Strongly Agree	Agree	Disagree	Strongly disagree
I can help the environment				
I think my friends care about the environment				
Teachers can play an important role in solving environmental problems through teaching.				

8. How important are environmental problems to you?

Very important	Important	Not important
----------------	-----------	---------------

9. In what way, if any, has studying Education for Sustainability altered your **motivation** to include it in your teaching?

10. In what way, if any, has studying Education for Sustainability altered your **confidence** to teach it?

Thank you for your time.

Appendix 3.2: Interview schedules: Phase One

Interview A: June 2007 (T2)

Guide to Questions

Name Home town: Internship school:

Address for future contact: mail; phone; email; mobile.

Participants are aware that the purpose of the interview is to gain their reflections on EDSE 412 and that this research is for the benefit of future pre-service teachers.

Evaluation of the interview schedule: (a) Will these questions provide an answer to the question: *How does a teaching unit in EfS impact on pre-service teachers?*

(b) Will this interview schedule ‘extend’ the information gained from the survey?

	Question	Rationale
1	By motivation I mean <i>wanting</i> to do something, and by confidence I mean feeling you are <i>able</i> to do something. <i>a. From your experience of EDSE 412 what do you think has influenced your motivation to teach EfS?</i> <i>b. How?</i> <i>c....and your confidence to teach EfS?</i> <i>d. How?</i>	Participants know the purpose of the research and may possibly come to interview with a view that they are keen to express. The general questions at the beginning of the interview asks for an overall reflection and is designed to allow opportunity for any such view to be expressed before the following questions shape participant responses.
2	I sometimes wonder what people have in mind when they’re about to start teaching. <i>a. What’s important for you about teaching in general?</i> <i>(What place do you see for EfS in your teaching?)</i> <i>b. What experiences have you had that contribute to your motivation to include EfS?</i>	This question seeks to identify the participants’ underlying motivation for teaching. Will an element of EfS surface in participant’s underlying personal goals? If EfS is not evident in general goals, the direct question ‘ <i>What place do you see for EfS in your teaching ?</i> ’ can be asked. <i>What experiences have you had that contribute to your motivation to towards EfS?</i> is a general question which allows participants to mention influences other than EDSE 412 on motivation.
3	Accompanying this question is a list of some of items incorporated in EDSE 412 (see below). I’d like you to look at the list and: <i>a. Mark items that contribute to your motivation and confidence in a positive way.</i> <i>b. Tell me about some of these that maybe stand out as contributing in a positive way to your motivation towards EfS.</i> <i>c. Tell me about some of these</i>	This question refreshes the interviewee’s memory of the experiences they have had. It asks for a direct subjective evaluation in terms of confidence and motivation related to particular content and teaching strategies that have been presented to them during EDSE 412 (see below). Each item on the list refers to either content, teaching strategy or theory experienced by pre-service teachers in class work during the semester. Bandura (1997) argued that confidence is not an ‘umbrella’ feeling but that teachers feel more confident about particular subject matter or particular teaching contexts than others.

	<p><i>that maybe stand out as contributing in a positive way to your confidence in EfS.</i></p> <p><i>e. Tell me about any things on the list that you don't feel particularly confident about?</i></p> <p><i>f. What do you know now that you didn't know before?</i></p> <p><i>g. Was there anything you found out or that we did that 'blew you out of the water'?</i></p>	
4	<p><i>a. Were there some things in EDSE 412 that made you think 'Oh that would fit in really well with ... (something that you had learnt elsewhere in the BEd)?</i></p> <p><i>b. How?</i></p>	<p>EfS and the BEd award: there are those who argue that because EfS is taught in schools in an integrated way, transcending subject boundaries, then it should also be taught throughout teacher training awards. In this way EfS could be incorporated as part of the approach in each curriculum area and each skills area.</p> <p>Here I am trying to get a picture of the links that pre-service teachers themselves can make with content/ skills/ theories that they encounter elsewhere. Answers to this question may help us link EDSE 412 to other experiences that the pre-service teachers have during their course and to other expectations that they encounter.</p>
5	<p><i>a. Tell me what diminishes your motivation towards EfS?</i></p> <p><i>b. What diminishes your confidence towards EfS?</i></p> <p><i>c. Tell me about what you think might put you off EfS once you start in a school.</i></p>	<p>Question (a) tries to identify areas where participants do not feel motivated.</p> <p>Question (b) tries to identify anything that diminishes confidence.</p> <p>Question (c) asks the participant to match present position with an imagined future.</p> <p>Question 5 consists of direct questions aimed to encourage interviewees to express any doubts they may hold. This question is important given the interviewer/ interviewee relationship which could cause interviewees to feel that they should report only positive views.</p>
6	<p><i>Is there anything you would like to tell me?</i></p>	

contribution to motivation	Teaching strategies used/learnt about	contribution to confidence
	Experiential learning as a teaching strategy eg visiting woodland, sewerage treatment works	
	Inquiry learning.	
	How to be part of a whole school approach to environmental education.	
	Numerous sample activities such as following and mapping storm water drains, growing sprouts.	
	Jensen's model as a way of organising a teaching unit.	
	Values clarification: looking to see what values are hidden in news articles/ advertisements/ activities we give children	
	Using Environmental Education Centres.	
	Thinking skills: prioritising, thinking of consequences, other peoples' views, etc.	
	Doing investigations outdoors with children.	
	Using environmental education in integrated units. Planning lessons.	
	Life cycle analysis and ecological footprint as teaching tools.	
	Using children's literature to develop understanding and empathy with environment.	
	Using a cooperative learning approach.	
	How to do environmental audits.	
	Using video, interactive computer activities and other technologies for learning.	
	Finding out about things we can do to make a difference like taking shorter showers and writing to politicians.	

contribution to motivation	Content included	contribution to confidence
	Woodlands as habitat and interactions within the ecosystem.	
	Ecosystem services.	
	Plant adaptation (eucalyptus).	
	Water issues.	
	Salinity as a social, economic and environmental issue.	
	Climate change: connecting local to global issues.	
	Appropriate technology: choices, values and consequences.	
	Soil and soil organisms.	

contribution to motivation	Other ideas and experiences	contribution to confidence
	Learning about equity between people.	
	Thinking about environmental education as a pathway to more sustainable living.	
	Learning how to protect plants and animals and conserve habitat such as roadside reserves.	
	Teaching biodiversity with the children who visited from a local school.	
	Finding out about resources including web resources, published teaching units.	
	Thinking about the rights of species other than people.	
	Finding out how much water and energy I use.	
	Understanding how woodlands work and why wooded roadsides are worth fighting for.	
	Finding out about things our community does that help the environment.	
	Finding out about how you can choose what you buy and how that affects the environment.	
	Learning how you can encourage children to plan and act for more sustainable ways of living.	
	Becoming aware of the cultural values that influence you when you choose.	

Intern interviews September 2007 (T3): interview schedule

This interview schedule was used at T3 (during internship) as a trial to assist with construction of phase two instruments

1. Now that you've worked with the class and you've been in the school for 6 weeks, how do you interpret EFS. What does it mean for you?
2. Have you been able to integrate EfS into your program?
3. In what ways has the context of this school, what goes on in this school, other people in this school, in what ways has this school encouraged or allowed you to engage with EfS?
4. In what ways has the school, has the context of the school discouraged EfS?
5. How confident to you feel to engage with EfS and do you think this has changed now you have been working with a class?
6. How motivated do you feel now to include EfS, now that you have been working in a class.
7. What do you recall from 412 now that stays with you?
8. Is there anything that you want to tell me?

Appendix 3.3: Case instruments

1. Interview schedule: beginning teacher

A set of artefacts was prepared to assist interviewees with recall of experiences they had had as part of EDSE 412. The artefacts consisted of photographs of the pre-service teacher group engaging in particular activities, as well as specific readings, diagrams and other materials actually used to assist with teaching during the university unit. Amongst the artefacts was the list of EDSE 412 content items printed below. This list was used as a prompt in association with question 9.

In addition the beginning teacher was asked to explain his or her environment-related curriculum choices; nominate who supported them in the school and why, what support they received and why; nominate what they felt was lacking in support within the school and why; suggest any barriers to their environment related activity and discuss their future plans and desires in relation to EfS.

1. If you were to engage your students in EfS, what would be most important for you to develop and why? Tell me what you think are the important things you have learnt and that have a bearing on your teaching of EfS.

2. What is most important for you in teaching overall?

3a. Do you think you feel more motivated or less motivated to include EfS than you did a year ago? Rank motivation 1 to 10 where 10 is lots. Can you account for this?

3b Do you think you feel more or less confident to include EfS than you did a year ago? Rank confidence 1 to 10 where 10 is lots. Can you account for this?

How do you see these views reflected in your work?

4a. Tell me about EfS activities you've been involved with in this school. Easy? Hard? Why? What's something that's hard?

4b Can you show me EfS in your program? (knowledge, action, integration, skills, values).

4c ... in anything in the way the classroom is managed (paper, lights, etc)

4d ... during playground duty

4e ... in communications such as class assembly items and classroom displays

5. Tell me about who or what supports EfS in this school? (resources available eg teaching resources, yard resources such as a worm farm or native garden, personnel, school climate)
6. What do you see as the limitations / what frustrates your efforts?
7. Thinking of those still at university, what do you think is of particular importance in units for beginning teachers if they are to engage in EfS?
8. If you were offered some further professional learning in EfS, what would you like to see included in the offering?
- 9a. What do you recall as the best parts of 412 and why?
- 9b. How has the 412 experience influenced what you think and what you do?
- 9c. Have you used / adapted any elements in your teaching? How? Why? (artefacts)
- 9d. What do you recall as parts of 412 as of least interest to you? Explain why?
- 9e. What do you feel could have been dealt with better / in more depth / in a different way?

Teaching strategies used/learnt about	Reflection /Impact on teaching
Experiential learning as a teaching strategy eg visiting sewerage treatment works, eco-house, Environmental Education Centre, playing eco-games	
Inquiry learning (the assessment task)	
How to be part of a whole school approach to education for sustainability	
Numerous sample activities such as following and mapping storm water drains, growing sprouts.	
Jensen's model as a way of reviewing a teaching unit	
Values clarification: looking for what values are hidden in news articles/ advertisements/ activities we give children	
Thinking skills: prioritising, thinking of consequences, other peoples' views, etc	
Learning how to conduct investigations outdoors with children eg in the woodland	
Placing education for sustainability into integrated units. Planning lessons.	
Life cycle analysis and ecological footprint as teaching tools.	
Using children's literature to develop understanding and empathy with environment.	
Using a cooperative learning approach	
Learning how to do environmental audits	
Using video, interactive computer activities and other	

technologies for learning	
Finding out about things we can do to make a difference like taking shorter showers and writing to politicians	
Finding out about resources including web resources, published teaching units	
Teaching about biodiversity with the children who visited from a local school	

Content included	Reflection /Impact on teaching
Woodlands as habitat and interactions within the ecosystem	
Ecosystem services	
Plant adaptation (eucalyptus)	
Water issues	
Climate change: connecting what we can do locally to global issues	
Appropriate technology: choices, values and consequences (beat the cream)	

Many values were considered during 412. Can you reflect on these ideas?

Other ideas and experiences	Reflection /Impact on teaching
Learning about equity between people: we don't all have the same ecological footprint	
Thinking about education for sustainability as a pathway to more sustainable living	
Thinking about the rights of species other than people	
Finding out how much water and energy I use	
Learning how to protect plants and animals and conserve habitat such as roadside reserves	
Finding out about things our community does that help the environment.	
Becoming aware of the cultural values that influence you when you choose	
Finding out about how you can choose what you buy and how that affects the environment	
Learning how you can encourage children to plan and act for more sustainable ways of living	
Seeing an environmental issue (salinity) as a social, economic and environmental issue	

7. What support / professional learning would you like to assist your work in environmental education / EfS?
8. Other?

Appendix 3.4: Documents verifying research approval from UNE and NSW DET

PLANNING AND INNOVATION



Ms Julie Kennelly
'Mimosa' Rockvale Road MSF 2006
ARMIDALE NSW 2350
AUSTRALIA

Dear Ms Kennelly

SERAP Number **2007217**

I refer to your application to conduct a research project in NSW government schools entitled *Pre-service teacher education supporting education for sustainability*. I am pleased to inform you that your application has been approved. You may now contact the Principals of the nominated schools to seek their participation.

This approval will remain valid until 21 July 2009.

The following researchers or research assistants have fulfilled the Working with Children screening requirements to interact with or observe children for the purposes of this research for the period indicated:

Name	Approval expires
Julie Kennelly	30 April 2009

You should include a copy of this letter with the documents you send to schools.

I draw your attention to the following requirements for all researchers in NSW government schools:

- School Principals have the right to withdraw the school from the study at any time. The approval of the Principal for the specific method of gathering information for the school must also be sought.
- The privacy of the school and the students is to be protected.
- The participation of teachers and students must be voluntary and must be at the school's convenience.
- Any proposal to publish the outcomes of the study should be discussed with the Research Approvals Officer before publication proceeds.

When your study is completed please forward your report marked to General Manager, Planning and Innovation, Department of Education and Training, GPO Box 33, Sydney, NSW 2001.

Yours sincerely



Dr Jenny Donovan
General Manager, Planning and Innovation

25 June 08

NSW Department of Education & Training

Level 6, 35 Bridge Street ° GPO Box 33 ° Sydney NSW 2001 ° T 02 9561 8744 ° F 02 9561 8941 E serap@det.nsw.edu.au

HUMAN RESEARCH ETHICS COMMITTEE

MEMORANDUM TO: A/P T Maxwell/Ms J Kennelly
School of Education

This is to advise you that the Human Research Ethics Committee has approved the following:

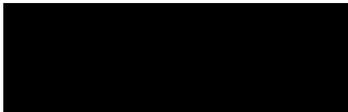
PROJECT TITLE: Pre-service teacher education supporting education for sustainability.
COMMENCEMENT DATE: 13/04/2007
COMMITTEE APPROVAL No.: HE07/058
APPROVAL VALID TO: 13/04/2008
COMMENTS: Nil. Conditions met in full.

The Human Research Ethics Committee may grant approval for up to a maximum of three years. For approval periods greater than 12 months, researchers are required to submit an application for renewal at each twelve-month period. All researchers are required to submit a Final Report at the completion of their project. The Progress/Final Report Form is available at the following web address: http://www.une.edu.au/research-services/ethics/hrec_pages/final.report.doc

The *NHMRC National Statement on Ethical Conduct in Research Involving Humans* requires that researchers must report immediately to the Human Research Ethics Committee anything that might affect ethical acceptance of the protocol. This includes adverse reactions of participants, proposed changes in the protocol, and any other unforeseen events that might affect the continued ethical acceptability of the project.

In issuing this approval number, it is required that all data and consent forms are stored in a secure location for a minimum period of five years. These documents may be required for compliance audit processes during that time. If the location at which data and documentation are retained is changed within that five year period, the Research Ethics Officer should be advised of the new location.

13/04/2007



Jo-Ann Sozou
Secretary

HUMAN RESEARCH ETHICS COMMITTEE

MEMORANDUM TO: A/Prof T Maxwell & Ms J Kennelly
School of Education

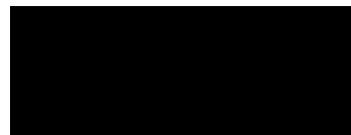
This is to advise you that the Human Research Ethics Committee has approved the following:

PROJECT TITLE: Pre-Service teacher education supporting education for sustainability.
COMMENCEMENT DATE: 21/07/2008
COMMITTEE APPROVAL No.: HE08/051
APPROVAL VALID TO: 21/07/2009
COMMENTS: Nil. Conditions met in full.

The Human Research Ethics Committee may grant approval for up to a maximum of three years. For approval periods greater than 12 months, researchers are required to submit an application for renewal at each twelve-month period. All researchers are required to submit a Final Report at the completion of their project. The Progress/Final Report Form is available at the following web address: <http://www.une.edu.au/research-services/forms/hrecfinalreport.doc>

The *NHMRC National Statement on Ethical Conduct in Research Involving Humans* requires that researchers must report immediately to the Human Research Ethics Committee anything that might affect ethical acceptance of the protocol. This includes adverse reactions of participants, proposed changes in the protocol, and any other unforeseen events that might affect the continued ethical acceptability of the project.

In issuing this approval number, it is required that all data and consent forms are stored in a secure location for a minimum period of five years. These documents may be required for compliance audit processes during that time. If the location at which data and documentation are retained is changed within that five year period, the Research Ethics Officer should be advised of the new location.



Jo-Ann Sozou
Secretary

28/04/2008

This is a unit for internal students and participation in all parts of the unit is obligatory.

In all Australian states, increasing energy and resources are being dedicated to environmental education with a strong orientation to education for sustainability. This refers in particular to a style of teaching and learning that develops the kinds of values and skills that enable and motivate citizens to engage in and promote more sustainable lifestyles at individual, social and institutional levels. In recognition of the imperatives of sustainable living this unit promotes a whole school approach to education for sustainability. It also promotes a teaching style characterised by:

- significant studies where students are engaged in issues of immediate importance to their lives;
- development of higher order thinking skills in relation to sustainability issues;
- cooperation amongst learners in pursuit of greater sustainability;
- engagement of students in environmental projects at the levels of investigation, scrutiny of values influencing decision making, visioning for a shared and more sustainable future, planning, democratic decision making and action for a more sustainable lifestyle;
- a regard for knowledge as problematic;
- provision of abundant and varied opportunities for communication of environmental ideas;
- provision of experiences appropriate to the developmental stage and needs of learners and to the goals of various Key Learning Areas; and
- consistent with the various Statements and Policies that apply to Environmental Education in Australia.

Unit work will be presented through workshops and practical activities in the laboratory and field. Students will also participate in compulsory visits to a National Park, an Environmental Education Centre, a local energy efficient home and a Water Filtration and Sewage Treatment Works.

Aims and objectives

The following aims and objectives are annotated to show relevance to elements of the Framework of Professional Teaching Standards (NSW 2006) <http://www.icit.nsw.edu.au>. The inclusion of EfS rests upon its integration into subject and/or pedagogy based units of study at the discretion of the teacher education providers. The standards from the NSW Institute of Teachers relevant to EDSE 412 are incorporated in the unit objective statements and are printed in brackets.

On completion of this unit, you should have:

- demonstrated understandings of the diversity and interrelationships between the physical and living components of the Australian environment and skills to explore, observe, measure, record, analyse and interpret data pertaining to the environment (1.1.1 content knowledge).
- demonstrated skills in the pedagogy of Science (as indicated in *Science and Technology K-6* (NSW Board of Studies, 1992) (1.1.3 knowledge of pedagogy and curriculum requirements), and of Education for Sustainability (as indicated in *NSW Policy on Environmental Education For Schools*, and *Educating for a Sustainable Future: A National Environmental Education Statement for Australian Schools*), and confidence in your ability to integrate Education for Sustainability into all Key Learning Areas in particular Science and Technology.
- developed understanding of the importance of respecting and conserving indigenous knowledge and cultural heritage (2.1.1).
- demonstrated use of ICT and other relevant technologies (1.1.4 knowledge of relevant ICT applications).
- demonstrated ability to prepare teaching / learning sequences suited to students of different stages, in varying contexts and with consideration for prior learning (2.1.2, 2.1.4 knowledge of student development).
- demonstrated ability to prepare teaching materials in co-operative working situations with suitable attention to outcomes, sequencing and use of current relevant resources (3.1.1, 3.1.2, 3.1.3, 3.1.4).

- developed the skill to identify the extent of human impact on the environment, particularly in relation to land degradation, water quality, introduced organisms and air quality.
- developed the capacity to identify the impact of individual, political and institutional values on decision making in relation to the environment.
- developed an understanding of how humans use technology to manage their environment and an ability to make purposeful choices in order to achieve a more sustainable lifestyle.
- understood that knowledge is uncertain and may change over time and that consequently we need to act with caution in relation to our environment.
- investigated and acted to improve sustainability in relation to a chosen issue.

Appendix 4.2: Weekly outline of topics for *Education for Sustainability for the K-6 Curriculum*, a six credit point final year compulsory unit of study for a Bachelor of Education (Primary) award.

Week	Topic	Week	Topic
1	Constructing a view: Education for Sustainability. Environment in the media and values analysis. Inquiry learning and investigations in local community contexts.	8	Everything comes from nature: life cycle analysis, ecological footprint, carrying capacity and consumer behaviour. Values clarification and analysis. Global perspectives.
2	Connecting with Wonder: Experiential learning in hidden worlds (woodland visit, working outdoors with children). Quality Teaching and experiential learning.	9	A whole school approach to education for sustainability: how it looks in practice, auditing, the SEMP Energy: global perspectives.
3	Active learning for primary school students: woodlands, biodiversity and ecosystem services. Teaching natural systems. Plant adaptation in Australia.	10	Appropriate technology: choices, values and consequences. Appropriate technology in a local context: visit to an energy efficient home
4	Using story and experience to develop empathy with place. Conservation and threatened species. Special places: visit to a local national park.	11	Education for sustainability: shaping the future. Lessons, teaching units, the scope and sequence plan, green dates and a whole school plan.
5	Water issues in Australia: inquiry using a cooperative learning approach.	12	Everything is connected to everything else: the nature of soil and the role of soil organisms. Visit to a local environmental education centre.
6	Water issues in Australia: salinity as a social, economic and environmental issue. Learning in a local context: visit to local sewage treatment works.	13	Assessment in education for sustainability.
7	Water and primary school learning. Audits and planning.		

Appendix 4.3

Policy Objectives

Appendix 4.3 A Education for sustainability: learning objectives (national)

From *Educating for a Sustainable Future: A National Environmental Education Statement for Australian Schools* (ADEH, 2005)

The learning objectives (ADEH, 2005:8-10) are presented in four sections: knowledge and understandings; skills and capabilities; attitudes and values; and action and participation:

Knowledge and understandings

This includes an understanding of:

- the nature and function of ecological, social, economic and political systems and how they are interrelated;
- the natural and cultural values intrinsic to the environment;
- the impact of people on environments and how the environment shapes human activities, with particular reference to unique and distinctive Australian heritage traditions and settings;
- the ways different cultures view the importance of sacredness in the environment;
- the role of cultural, socioeconomic and political systems in environmental decision making;
- the principles of ecologically sustainable development;
- the responsibilities and benefits of environmental citizenship, including the conservation and protection of environmental values;
- the importance of respecting and conserving indigenous knowledge and cultural heritage; and
- how knowledge is uncertain and may change over time, and we therefore, need to exercise caution in all our dealings with the environment.

Skills and capabilities

The ability to engage in:

- explorations of the many dimensions of the environment using all of their senses;
- observations and recording of information, ideas and feelings about the environment;

- identification and assessment of environmental issues;
- critical and creative thinking about environmental challenges and opportunities;
- consideration and prediction of the consequences (social, cultural, economic and ecological) of possible courses of action;
- oral, written and graphic communication of environmental solutions and issues to others;
- cooperation and negotiation to resolve conflicts that arise over environmental issues; and
- individual and collective action to support desirable outcomes.

Attitudes and values

These are reflected in an appreciation and commitment to:

- respecting and caring for life in all its diversity;
- conserving and managing resources in ways that are fair to present and future generations;
- building democratic societies that are just, sustainable, participatory and peaceful; and
- understanding and conserving cultural heritage.

Action and participation

Environmental education for sustainability also involves applying such knowledge and understandings, skills, attitudes and values in active and informed participation to address environmental issues, problems and opportunities. This includes:

- a willingness to examine and change personal lifestyles to secure a sustainable future;
- the ability to identify, investigate, evaluate and undertake appropriate action to maintain, protect and enhance local and global environments;
- a willingness to challenge pre-conceived ideas, accept change and acknowledge uncertainty; and
- the ability to work cooperatively and in partnership with others.

Appendix 4.3 B Education for sustainability: learning objectives (NSW)

From *Environmental Education Policy for Schools* (NSW DET, 2001a)

Students will develop knowledge and understandings about:

- the nature and function of ecosystems and how they are interrelated;
- the impact of people on environments;
- the role of the community, politics and market forces in environmental decision-making;
- the principles of ecologically sustainable development;
- career opportunities associated with the environment.

Students will develop skills in:

- applying technical expertise within an environmental context;
- identifying and assessing environmental problems;
- communicating environmental problems to others;
- resolving environmental problems;
- adopting behaviours and practices that protect the environment;
- evaluating the success of their actions.

Students will develop values and attitudes relating to:

- a respect for life on Earth;
- an appreciation for their cultural heritage;
- a commitment to act for the environment by supporting long term solutions to environmental problems.

Objectives for the management of resources

Schools will:

- take a whole-school approach to policy development to include such environmental aspects such as purchasing, energy monitoring, water consumption and waste disposal;
- employ best practice in management of resources;
- identify learning opportunities for students resulting from practices in the management of resources.

Objectives for management of school grounds

Schools will:

- manage school grounds in accordance with the principles of ecologically sustainable development;
- develop school grounds as part of the overall school plan;
- identify learning opportunities for students resulting from the management of school grounds.

Appendix 4.4: Questions that pre-service teachers used in one values analysis activity.

Students applied the questions to a variety of written texts that focused on local environmental issues.

Questions to assist with analysis:

- What is the source of the information?
- Is the issue of local, national or global interest?
- What is the material telling you?
- What techniques does the author use to influence your opinion or actions?
Does the author use omissions, stereotypes, reference to doubtful or unknown authority, emotive language, etc
- What are the aims/ goals/ objectives (AGO) of the author?
- How do you know if the statements are true?
- Are there some that may not be true?
- Why would someone say something that may not be true?
- Why is it important to be well informed about this issue?

Appendix 5.1 Tabulated results from Survey A (T1) and Survey B (T2).

Sample size is 104.

Table 5.1: Categories of explanation from analysis of pre-service teachers' free response in survey with regard to rankings of desire to include EfS in teaching at the beginning and end of EDSE 412 (QA2;QB2).

Explanation category	T1 % of cohort	T2 % of cohort
Reasons for positive desire to engage with EfS:		
Concern for the future	26	11
Interest in the subject	1	0
Care for environment	16	10
It's important	11	17
I want to improve the image of rural industry	1	0
So children won't worry	4	1
Children need: to care, to take action; skills to improve environment; to sustain environment	10	0
I have identified the role of education in sustainability	0	17
Increased awareness	0	10
Because I can	0	2
Reasons for not having positive desire to engage with EfS		
Other things are more important	14	10
I'm sick of it	2	0
I hadn't thought about it; I don't know much	4	0
I'm concerned but I don't know what to do	1	0
I'm not confident	2	0
Response not available	8	22

Table 5.2: Categories of explanation from analysis of pre-service teachers' free response in survey with regard to rankings of confidence in EfS at the beginning and end of EDSE 412 (QA4;QB4).

Explanation category	T1 % of cohort	T2 % of cohort
Reasons for confidence in EfS		
Strong values and interest/ desire for a better world	18	1
Personal experience of sustainability	1	0
Existing knowledge	10	0
Confidence in general ability to teach	3	0
Children will be interested	2	0
Acquired skills; exposure to resources and activities	0	38
New knowledge	0	36
Success in EDSE 412	0	1
Realisation that children are interested	0	1
Having experience in EfS	0	1
Reasons for lack of confidence in EfS		
Not knowing teaching strategies	18	0
Lacking in knowledge	37	9
Inability to program for EfS	0	3

Have not seen EfS at practicum or in own schooling	4	0
Own lifestyle is unsustainable	1	0
Feels it doesn't fit with schools	0	5
Have never taught it	0	5
Response not available	6	0

Table 5.3: Survey rankings of desire to engage with EfS for five case study participants at the beginning and end of EDSE 412 (Survey QA1;QB1). VS=very strong; S=strong; M=medium; W=weak; VW=very weak

Name of case study participant	Ranking of desire to include EfS in teaching: T1	Ranking of desire to include EfS in teaching: T2
Andrew	S	VS
Annie	VS	VS
Sue	S	S
Tony	VS	VS
Trudy	VS	VS

Table 5.4: Survey rankings of desire to engage with EfS for the cohort of pre-service teachers at the beginning and end of EDSE 412 (Survey QA1;QB1).

% ranking of cohort at	Very strong	Strong	Medium	Weak	Very weak
T1	26	50	21	0	1
T2	35	52	12	0	0

Table 5.5: Survey rankings of confidence to engage with EfS for five case study participants at the beginning and end of EDSE 412 (Survey QA3;QB3). VC=very confident; C=confident; M=medium; NVC=not very confident; NC=not confident at all.

Name of case study participant	Ranking of confidence to include EfS in teaching: T1	Ranking of confidence to include EfS in teaching: T2
Andrew	M	C
Annie	VC	VC
Sue	C	C
Tony	C	C
Trudy	C	VC

Table 5.6: Survey rankings of confidence to engage with EfS for five case study participants at the beginning and end of EDSE 412 (Survey QA3;QB3).

% ranking of cohort at	Very confident	Confident	Medium	Not very confident	Not confident at all
T1	6	29	51	14	0
T2	12	57	31	0	0

Appendix 11.1: Table providing a summary across the case study sub-headings for each beginning teacher. (Abbreviations: BT: beginning teacher; curric: curriculum; env: environment; chn: children)

Sub-heading	Andrew	Annie	Trudy	Tony	Sue
Context / Enrolment/ Socio-economic	Urban 400 mixed	Urban 400 higher	Urban 300 Multi-cultural	Urban 200 lower	Regional 500 mixed
School culture	Whole school EfS BT given strict curric direction	NAPLAN prioritised BT 'steered'	NAPLAN prioritised BT directed through curric and 'steering'	NAPLAN and 'care' prioritised. BT given quite strict curric direction	NAPLAN prioritised. BT given quite strict curric direction
Year level	1	2	2	2	6 then 4
BT views as pre-service teacher	Interested, but CAPA more interesting; Motivated by, for example, <i>Inconvenient Truth</i> , not so much from early life; Quite confident	Environment central to personal and teacher identity; Motivated; Confident.	Caring; Motivated; Confident; Lacking in science skills	Interested; Motivated; 412 made EfS legitimate.	Interested; Quite motivated; Quite confident; Confidence would be lessened if other teachers not 'on board'.
Self assessed motivation as BT	Diminished motivation	Higher motivation	Higher motivation	Frustrated by 'other agenda' Difficulty with programming	Less motivated: felt helpless because others did nothing.
BT perception of school culture	Restrictive re curric; EfS in the hands of the RFF teacher	Restrictive re practice; Not a cohesive staff	Restrictive re curric; Staff supportive of Trudy in general	Restrictive re curric; Student welfare priority; Cohesive staff;	Restrictive re curric; Limited interest in EfS from others
What BT did	Class routines for pro-env behaviour firmly established; Supported existing school activity; Did not program for EfS; Did not recognise own incidental EE; Happily followed school's	Class routines for pro-env behaviour firmly established; Vegetable garden; Programmed EfS especially into HSIE & English; Integrated EfS opportunistically	Class routines for pro-env behaviour firmly established; Programmed for EfS; Integrated EfS opportunistically; Composting established.	Class routines for pro-env behaviour not well established; No programming for EfS; Ad hoc / incidental EfS in KLAs but did not recognise this as EfS; EEC visit and Earth Hour; Garden for social reasons.	Class routines for pro-env behaviour firmly established; Programmed for EfS (Year 6); Integrated EfS opportunistically where possible.

	EfS routines				
EfS constrained by:	HSIE in RFF ie program constraint; Held other personal priority (CAPA).	NAPLAN culture; Principal (no support); Lack of cohesion among staff.	NAPLAN culture; Disinterest from principal; Inexperience with practical tasks;	NAPLAN culture; Held other personal priority (welfare); cultural perception in school that chn were to be instructed ie not developed as leaders	NAPLAN culture; Attitudes of other staff
EfS enabled by:	Whole school EfS in place	Personal determination; Personal conception of EfS as inclusive of community etc Use of Jensen (2001) for planning	Personal motivation; Sought allies within school; Programmed strategically	Others modelled eg vegetable growing; Determination to do practical things eg EEC visit	Own interest and well developed conception of EfS; Conscientious approach; Reflective practices.
Links to 412	Became informed; Appreciated teaching strategies.	Legitimised existing interest/ desire; Opportunity to practise EfS during 412; Liked strategies and resources.	Provoked interest and thought; Provoked existing concerns; Provided teaching strategies; Provided information.	Became informed; Confidence and interest from inquiry learning; Made EfS legitimate.	Provided teaching strategies and resources; Informed; Provoked interest and concern.

Appendix 11.2 Table showing how the work of each beginning teacher aligned with the definition of EfS Tilbury (1995) This definition is shown in the first column. As a check, an example of just one experience offered to the cohort of pre-service teachers in EDSE 412 for each of Tilbury’s descriptors for EfS is listed in the second column. The table shows some of those patterns of response which most inform the question about what the beginning teachers did.

The definition of EfS used in this column is adapted from Tilbury (1995).	One example of how EfS was expressed in EDSE 412	Trudy’s actions	Andrew’s actions	Tony’s actions	Sue’s actions	Annie’s actions
EfS has relevance in that it deals with contemporary issues of concern to learners who are encouraged to explore links between their personal lives and wider environmental and social concerns.	The inquiry learning project used for assessment required these links to be made.	Trudy encouraged students to explore links between personal behaviour, waste management, water use and environment. An example was teaching surrounding waste sorting and compost making.	Andrew encouraged students to explore links between personal lives and water use and personal behaviour and littering	Tony raised a number of relevant issues with his class but provided little evidence of extending children’s understanding to the links between personal lives and the issue at hand.	Sue did this in many ways. An example is through the use of ecological footprint calculation	Children in Annie’s class explored links between their food supply and impacts on the surrounding environment eg clearing of vegetation and transport.
EfS has a holistic curriculum base in addressing environmental issues and in teaching and learning, identifying the whole picture surrounding an issue.	Pre-service teachers were required to apply applied all elements of Jensen’s (2002) model. The inquiry learning project required this holistic approach.	Trudy prepared a unit of work which developed understandings of environmental links through English and science.	There was very little evidence of this. Certainly EfS was not programmed in any way. There was ad hoc and partial discussion of issues.	There was very little evidence of this. Certainly EfS was not programmed in any way. There was ad hoc and partial discussion of issues.	This aspect of EfS was not really accomplished by Sue given the constraints defined by school organisation of curriculum	Annie applied all elements of Jensen’s (2002) model showing four kinds of knowledge required for action competence.

<p>EfS not only teaches about values but also teaches values, in this case ‘an environmental ethic which has sustainable living at its core’; highlighting ‘the importance of valuing the interrelatedness of the web of life and promot[ing] the principal value of concern for all life forms’ (Tilbury,1995:201).</p>	<p>An environmental ethic was demonstrated throughout and values analysis clarification were a part of the unit curriculum.</p>	<p>Trudy taught values such as interest in, and care for environment through her ‘Caring for the Environment’ unit, through her reading program and through classroom routines.</p>	<p>Andrew taught values such as conservation of water and valuing of life through the aesthetic appreciation of the dragon fly and through the study of butterfly life cycle. Andrew was conscientious in ensuring his class supported the school’s sustainability initiatives.</p>	<p>Tony was not conscientious about demonstrating an environmental ethic as in turning off appliances in the classroom even though he had organised Earth Hour. Maybe this suggests that Tony had not reflected deeply on his own environmental ethic and his role as teacher in modelling environmental values. He did demonstrate care for living things through his teaching surrounding frogs.</p>	<p>Sue promoted an environmental ethic through her classroom routines, through selection of children’s literature and through lessons outdoors.</p>	<p>Annie demonstrated and focused her teaching on a strong environmental ethic with particular reference to the web of life. She ensured that children in her class followed classroom routines that reflected an environmental ethic.</p>
<p>EfS is issues-based wherein students ‘consider matters of fact, values and morality’, to allow for an ‘exploration of moral, social and political values required for the development of an environmental ethic’ (Tilbury,1995:202).</p>	<p>Pre-service teachers engaged in exploration and expression of values in relation to various issues eg biodiversity conservation.</p>	<p>Trudy’s teaching unit surrounding children’s waste management examined facts; required children to identify ‘correct’ and ‘incorrect’ behaviours in the environment; and actively engaged them in processes of recycling, etc.</p>	<p>There is no evidence that this was a substantive or planned part of Andrew’s work.</p>	<p>There is no evidence that this was a substantive or planned part of Tony’s work.</p>	<p>Sue encouraged children to read about and discuss environmental issues. She encouraged children to view knowledge as problematic, questioning what they knew: ‘because a lot of the time they’ll just catch a bit on the news or something; overhear a conversation and they come in and they don’t have the full story’ [Su:int:26.8.08].</p>	<p>‘We looked at change over time. They looked at texts like <i>Window</i> and there they can see how the environment has been built up to accommodate humans and how that’s good and bad. So we used the picture book to support the idea of change in a place’. ‘So we had to talk about the natural trees and how it was before Europeans came and then what has happened afterwards with the</p>

						vineyards and now we can we try to make it so that the plants and animals and people can all live together' [An:int:6.4.09] .
EfS is action-oriented, both in encouraging learners to personally and collectively take actions towards sustainability, and in promoting the use of active teaching and learning strategies.	Pre-service teachers actively investigated environmental issues, and in the inquiry learning assessment task were required to act upon their findings.	Trudy strategically planned for student action. An example of this is Trudy's use of strategies such as holding a zero waste lunch day, compost making and establishing routines such as waste recycling.	Andrew co-operated in the sustainability activities organised for his students by the school but this was process learning not initiated by him. With his class his contribution was to sustainability as a product (eg ensuring the children sorted waste correctly) rather than to sustainability as a process of learning.	Tony engaged students in Earth Hour, etc but in the absence of exploration of energy issues in the curriculum, the efficacy of this action is unknown.	Sue encouraged children to follow routines which demonstrated care for the environment. She engaged them in active learning during Environmental Maths.	Children in Annie's class planted trees and vegetables and visited several places beyond the school for the purposes of investigating the surrounding environment.
EfS involves critical education, that is, an education that develops socially critical and political literacy skills, necessary because of the social complexity of environmental issues. Tilbury (1995:205) described critical education as:	Discussion, debate and text analysis were used to encourage a critical outlook on environmental matters, including the role of EfS itself.	In Trudy's environment unit children were asked to compare pristine and altered environments and to consider the consequences of their actions in the school environment. These activities	There is some evidence of this but critical education is not a planned and substantive element of Andrew's program	There is some evidence of this but critical education is not a planned and substantive element of Tony's program	Sue used strategies such as ecological footprint calculation which may have initiated discussion critical of social inequity of resource control. She encouraged critical comment from children through class discussion but there was no evidence of	Annie encouraged children to reflect upon the way in which the places they visited were being used and why they had been altered. Through creative arts she encouraged children to envisage the landscape as they would like it in the future. The way that she encouraged

<p>understanding of the root causes of ... environmental problems ... Critical thinking skills ... are crucial to the achievement of individual involvement in decision making to improve and maintain environmental quality.</p>		<p>represented initial steps in critical thinking at Year 2 level.</p>			<p>planning for critical education</p>	<p>children to develop an understanding of change over past, present and future as well as her questions to them about 'plants and animals living together' may represent initial steps in critical thinking for these young children.</p>
---	--	--	--	--	--	--